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C O N T E N T S

1. <u>Additions to Library</u>	E982	<u>Enzyme</u>
A GENERAL SCIENCE	E9G	<u>BIOCHEMISTRY</u>
B MATHEMATICS		
C CHEMISTRY	F	<u>TECHNOLOGY</u>
E9G BIOCHEMISTRY	F:7	Fermentation
F TECHNOLOGY	F1	Chemical Technology
	F145	Tin Technology
	F191	Metallurgy
2. <u>Pamphlets</u>		
3. <u>ISI Specifications</u>	G	<u>BIOLOGY</u>
PART II. 1. <u>Reprints</u>	G91	Microbiology
2. <u>Reports</u>	G912	Bacteriology
	G9121	Toxicology (Aflatoxin)
PART III. <u>Technical News Brief</u>	I	<u>BOTANY</u>
E92Z2 Protein	I:3	Plant Physiology
F3 Food Technology	I:33	Plant metabolism
F3:xP,FP Food, Preservation, Irradia-	I21	Yeast
-tion	I23	Fungi
F3;2;b12;a86 Food, Water, Quantity,	J	<u>AGRICULTURE</u>
Variability	J:4386-634	Insecticide
F3;91 Food, Protein	J37	Fruits
F3, (9R91) Food, Raw material cot-	J371	Apple
tenseed	J38	Cereals
F3,ZE;eF316 Food, Packaged, Aroma	J38:93	Cereals Physiology
F3,ZF4 Food, Dehydrated	J381	Rice
F3D3,ZE0(D9a) Carrots, Canned	J381:93	Rice physiology
F39K6 Oranges	J382	Wheat
F3ZG81,ZE Coffee, Packaged	J382:(E9G)	Wheat Biochemistry
PART IV. <u>Periodicals Title Service</u>	K	<u>ZOOLOGY</u>
	K9793	Rodents
2 <u>LIBRARY SCIENCE</u>	KX	<u>ANIMAL HUSBANDRY</u>
2x51 Classification	KX:1	Animal Nutrition
2x37 Documentation	KX332	Fish
	KX351	Fowl
A <u>GENERAL SCIENCE</u>		
A:1 Scientific Research	L	<u>MEDICINE</u>
B <u>MATHEMATICS</u>	L:33	Metabolism
B48 Operational Research	L:4537	Allergy
	L:461	Nutritional deficiency
C <u>CHEMISTRY</u>	L:524	Food poison
C5 Organic Chemistry	L:573	Nutrition
C5:3C53 Organic gas chromatographic	L:5730	Dietetics
Analysis	L293:46	Diabetes
C6 Aliphatic compound	L9C	CHILD
C6313 Glucose	L9C:461	Nutritional deficiencyChild
C92Z Amino acid		
C92Z:3C58 Amino acid, Gas chromato-	M	<u>USEFUL ARTS</u>
graphic analysis	M98	Packaging
C92Z2 Protein		
C92Z2:4 Protein synthesis	S	<u>PSYCHOLOGY</u>
C92Z2J Vegetable Protein	S:22	Taste
C94 Fats and Fatty acids	X	<u>ECONOMICS</u>
C95 Pigments	X8(A)	Industry
C96 Lipid	X8(F3)	Food Industry
C97 Vitamin	X8(F3:1)	Meat Industry

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E CHEMISTRY

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PART III. TECHNICAL NEWS BRIEF

E92Z2 Protein PROTEIN FROM CRUDE OIL

A Japanese scientist announced in Tokyo recently that he had succeeded in producing a high-grade edible protein from crude oil.

Professor Hisateru Mitskda of the Food Industry Laboratories of Kyoto University said the oil was treated with enzymes to produce the protein which was a tasteless white powder.

The protein could be flavoured to taste like meat; it was as digestible as milk protein and mixed with flour, it could be made into nutritious bread. [Food Indus J 2(6);1968;5].

F3 Food Technology ARTIFICIAL FOODS

A patent covering the production of artificial fruits and vegetables has been issued to the General Foods Corporation, White Plains, New York. The patent covers a substance referred to as an edible, crisp, chewable, non-uniform agglomerate of calcium alginate cells, with the addition of artificial flavourings and other substances. The cellular structure is produced by adding calcium salts to a water solution of alginic acid (seaweed) to form a gel structure. The purpose of the invention is described as a method of preparation of artificial fruits and vegetables which may be heated or cooked without losing their characteristics crisp texture. [Food Manufacture 43(10);1968;57].

SYNTHETIC FOOD DEVELOPED

Scientists at the University of Michigan have developed a new synthetic food which is designed to supplement the diets of underfed people throughout the world. Called Batina seed, the food is composed of cereal flours, toasted legume flours, wheat germ, dehydrated yeast and vitamin and mineral supplements.

The scientists estimate that the food could be produced in any nation at a minimal cost by using local food sources. It can be cooked in water and used as a gel with various rice dishes, or it can be toasted with a variety of low-vitamin foods to produce a balanced meal. Canner Packer 137(11);1968;44.

F3:xP,FP Food, Preservation, Irradiation LIMITED USE OF RADIATION FOR PRESERVATION

The potentialities of ionizing radiation as a means of preserving food products have been studied just as keenly in the USSR as in other parts of the world, but information about the progress of work there has been meagre. This gap has now been filled by the publication of an English language version of a recent Russian book Radiation Processing of Food Products by L.V.Melitskii, V.N.Rogachev and V.G.Krushchev. The document is doubly interesting because the translation is the work of an IBM 7090 computer that Union Carbide Nuclear Division's computing Technology Centre operate in the US at Oak Ridge National Laboratory, Tennessee. The machine's edited work is available as a 115-page report, no. ORNL-11C14. It contains a general account of Russia's irradiation

facilities and the results of researches at the A.N.Bakh Biochemical Institute of the USSR academy of Sciences, the All-Union Scientific Research Institute of the Food Canning and Vegetable drying Industries and some other USSR for sprout inhibition of potatoes; disinfection of grain, dried fruits and dry food concentrates; and for extending the shelf life of fresh fruit and vegetables. The maximum dose involved for these applications does not exceed 400 k/rads. Doses in the range 600-800 k/rads have been authorized for prolonging shelf life by treating experimental lots of dressed poultry, partially processed raw meats, and kitchen-ready meats (e.g. fried steak) all in plastic packs. New Scientist 39(614);1968;45.

F3;2;b12;a86 Food, Water, Quantity, Variability
WATER ACTIVITY IN FOOD DISCUSSED

We don't know much about water in food. How can lettuce and gelatin have the same (95 per cent) water content? And how can both have more water than milk? And what does water content have to do with microbial activity or spoilage of dry products?

Four papers were presented on various aspects of water activity in food at the IFT Convention by W.D.Powrie, University of Wisconsin; John H. Silliker, Silliker Labs, Chicago; L.Acker, Institut fur Lebensmittelchemie der Universitat Munster, West Germany; and L.B.Rockland, USDA Western utilization Research and Development Division, Pasadena, Calif. To some extent, they were highly technical. And to some extent, they all admitted the need for more basic information on the influence of water on food quality and stability. But they have defined the fact that available water, from a microorganism growth standpoint, has nothing to do with analytical moisture content. And they know that certain microorganisms require specific vapor pressures in a food system. They also know that low temperature does not necessarily improve the stability of food products. And they've found a new isotherm which explains and can predict, the optimum moisture range above and below which a low moisture food will spoil more rapidly. While this range of knowledge is still vastly limited, it may become possible to control spoilage in certain foods by appropriate adjustment of both the water content and equilibrium relative humidity of the food. Canner Packer 137(9);1968;38.

F3;91 Food, Protein
PROTEIN RICH FOODS GET POOR RECEPTION

Protein concentrates are good for you but it is not easy to make people accept them. This is the conclusion which emerges from reports by specialists who met in Rome last September.

The high protein products are made from a variety of normal foods, including fish, millet, groundnuts. They are usually manufactured by forward looking companies, often with the blessing of the government and one of the major international organizations.

What the new foods run into is the fact that they look, taste and smell different from the foods people have grown up with. They clearly have more nutritive value but the consumer does not reach out for them.

This was brought out by scientific papers presented to the Protein Advisory Group, which is made up of high level people nominated by the United Nations Children's Fund (UNICEF) the World Health Organization (WHO) and the Food & Agriculture Organization (FAO).

All efforts by private enterprise in South America to sell and promote high protein products have met with disappointing results, and in some cases have failed completely. Last year less than 7,000 tons of high protein products were manufactured on the Continent. In Peru, production of a high protein fish flour produced from anchoveta was discontinued after sales sank to a disastrously low level.

Similar difficulties were encountered in Africa. In Senegal, a factory producing a mixture of millet couscous and groundnut flour called Sopral had to be closed and liquidated. In Northern Nigeria, UNICEF had to stop buying and distributing another protein concentrate because of lack of marketing effort.

The following reasons were given for this failures: Traditions regarding food are stronger in developing countries than in developed ones. New foods, delivered in a new form of a new package, are looked upon with suspicion;

Most people ignore the meaning of the word protein, which consequently has no commercial appeal;

People shun high protein products for social reasons, regarding them as "Food for the Poor". [Food Trade Review 38(11);1968;49].

F3,(9R91) Food, Raw material cottonseed
Food from Cottonseed

Meat, bread and even bacon made from cottonseed may soon be a normal part of man's diet. And some simple protein foods may be prepared directly on the farm by the family that raises the cotton, says a Food and Agriculture Organisation release.

This is one of the prospects that emerged from a meeting of the protein advisory group in Rome recently.

The prupose of the group is to determine how new unconventional sources of protein can be developed.

Food elements can be separated from toxic or useless elements after seed varieties are selected for their high protein content by the farmers themselves.

UNICEF told the group that an edible cottonseed flour concentrate developed under contract in the United States-would soon be in production in India on a pilot scale. Food Industries Journal 2(6);1968;4.

F3,ZE;eF316 Food, Packaged, Aroma
ADDING FOOD AROMAS TO PACKAGING MATERIALS

The 3M Company has introduced a unique printing process for adding food product aromas to paper. The technique is called "MicroFragrance". The technique which imparts food aromas to paper or packaging materials has interesting marketing materials has interesting marketing ramifications in that the product in the freezer or on the store shelves

appearance. The initial announcement of the process at this time did not give any further details. Food Manufacture 43(10);1968;57.

F3,ZF4 Food, Dehydrated FOOD DEHYDRATION STUDIED

The dehydration of food products, although having reached a stage of considerable sophistication in working theories on how water is evaporated have been less serviceable than the trial and error methods of experiment. Dr. T.P. Labuza of the Massachusetts Institute of Technology, in a paper presented at the IFT Convention, studied and described in terms of a theory the mechanisms involved. Does the surface tension of the water in a product affect the rate ~~at~~ at which it it evaporates? Evidently it does, says Labuza. When enough of a surfactant is added to a model food system, it will slow down the drying because it reduces the capillary pressure. Capillary pressure brings the water to the surface of the product so that it can be evaporated. In addition to confirming the mechanism of evaporation, he also suggested that if porosity was the most important thing in dehydrating in order to make easier rehydration, this might be a useful avenue to study. Canner/Packer 137(9);1968;38.

F39D3,ZE0(D9a) Carrots, Canned ASEPTIC CANNING OF CARROTS

Canned carrots have never rated highly in taste panel tests. According to Dr.B.S. Luh of the University of California in a speech to the IFT Convention, aseptic techniques were used to put strained carrots in 6 ounce enameled cans, in efforts to investigate and improve the quality of the canned product. The resultant product proved superior to conventionally retorted carrots in color, aroma and flavor, said Dr. Luh. Rather than the HTST cook, however, the researchers attribute the improvement to the refinement of all preliminary steps involved in the treatment of the raw produce before entering the canning line. Canner Packer 137(11);1968;41.

F39K6 Oranges ORANGE AND GRAPEFRUIT TABLETS MADE

Orange and grapefruit may one day be served in tablet form, report US Department of Agriculture scientists who have made the tablets in research conducted to develop new uses for citrus.

The tablets-eight equal one orange or about half a grapefruit are light in weight and said to be pleasant tasting and inexpensive. They are made from orange or grapefruit crystals, two recent developments of USDA's Agricultural Research Service.

These tablets, or discs, were developed at the ARS Fruit and Vegetable Laboratory at Winter Haven, Florida, during efforts to improve the solubility of the citrus crystals. The crystals are made by drying concentrated citrus juices. As the crystals come from the drying process they are light and fluffy and tend to float on the water instead of sinking quickly and dissolving. To obtain particles with better solubility, the scientists developed a method of pressing the powder between steel rolls to form a sheet and grinding the sheets. During these studies, powder was also compressed into discs, which can be eaten like candy fruit drops. Food Trade Review 38(11);1968;49.

F3ZG81,ZE Coffee, Packaged COMPOSITE CAN FOR VACUUM PACKAGING

A leading US coffee manufacturer has introduced and is evaluating the first composite can for vacuum packed coffee. The spiral wound composite container, engineered by the R.C. Can Company, is considered as major break-through in vacuum packaging which traditionally has been in cans of tinplate or aluminium. The key to the container's unique vacuum capability and strength is its sophisticated body composite which sandwiches layers of paper, plastic, and foil between an extruded plastic lining and a scuff-resistant outer coating. The composite container is designed to be opened with a conventional can opener and is equipped with an external plastic snap-on lid for reclosure so that the can can be used as a storage container. In order to facilitate opening by a standard can opener, without damaging the container body, the lid is prescored to make sure the opener will bite into the lid.

Advantages claimed for the container are its lighter weight, lower cost and lower printing costs than the metal can, easy disposability by crushing and incineration, and a shelf life performance equal to that of the metal can.

One of the major advantages of the composite can is in printing and printing costs. There has been over a period of years, a trend toward upgrading the graphics of food containers in the USA. Metal cans are generally printed through lithography which increases costs tremendously for each colour used. The fibre composite can may be gravure printed, which is significantly cheaper for multi-colour work. Food Manufacture 43(10);1968;57.

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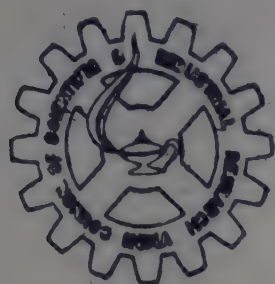
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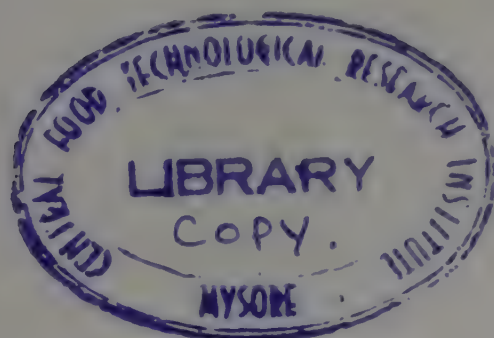
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C O N T E N T S

1. Additions to Library

A GENERAL SCIENCE
D ENGINEERING
E CHEMISTRY
E9G BIOCHEMISTRY
F TECHNOLOGY
G BIOLOGY
X ECONOMICS

J
J:4:634 AGRICULTURE
J:4386:634 Pesticide
J333:(E982) Insecticide
J341 Carrot enzyme
J341:(E982) Potato
J3521:(E982) Potato enzyme
J3621:(E982) Lettuce enzyme
J382:93 Pumpkin enzyme
J581:(E982) Wheat physiology
Groundnut enzyme

2. Pamphlets

PART II. 1. Reprints
2. Reports

K
K36 ZOOLOGY
Insecta

PART III. Technical News Brief

F85,3-0A Food, Processed
F85,3;910A Food, High protein
F85,39Q;eF31 Citrus products,
Flavour
F85,39ZA Bakery product
F85,3Zz1-OFE Egg, Freeze-dried
F85,3Z02 Algal Food
F85,3Z0375-OF4 Mushroom, Dehydrated

KX
KX35 ANIMAL HUSBANDRY
KX35:(E9G) Poultry
KX351 Poultry biochemistry
KX351:1 Fowl
Fowl nutrition

PART IV= Periodicals-Title Service

E CHEMISTRY
E681:3E1 Monosaccharide analysis
E6892 Starch
E6894 Cellulose
E92Z Amino acid
E92Z2 Protein
E92Z2J Vegetable protein
E92Z2J37 Fruit protein
E94 Fats and fatty acids
E95 Pigments
E96 Lipid
E982 Enzyme
E982:3 Enzyme analysis
E994 Pectin

L
L:33 MEDICINE
L:461 Metabolism
L:523 Nutritional deficiency
L:524 Public health
L:573 Food poison
Nutrition

M
M98 USEFUL ARTS
Packaging

X8(A) Industry
X8(F85,3) Food Industry

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E7
E94 TECHNOLOGY
Fermentation
Fats and oils

E1
E12 BIOLOGY
Microbiology
Bacteriology
E121 Toxicology(aflatoxin)

E3
E33 BOTANY
Plant physiology
Plant metabolism
E982 Plant enzymes
E9G Plant biochemistry

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4. D3
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from nuclear fallout.

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PART III. TECHNICAL NEWS BRIEF

F85,3-0A Food, Processed PROCESSED FOODS GAIN AGAIN

The average American is eating more processed foods than he did ten years ago. He's also eating less fresh food.

The important processed gain is in potatoes (dry, freeze) and in citrus concentrate.

A current USDA report shows that the biggest gain of all commodities in per ~~xx~~ capita consumption since the 1957-59 base period has been made by potatoes and sweet potatoes. The average consumer now eats 37 per cent more potatoes (fresh and processed) than he did a decade ago.

In other food groups: Processed vegetables are up 25 per cent; fresh vegetables are down 7 per cent; processed fruits are up 4 per cent; fresh fruits are down 15 per cent. [Canner/Packer 137(11);1968;16].

F85,3;910A Food, High protein

High protein foods and beverages will be developed and test marketed in India and Pakistan by Swift and General Mills, under contract with AID. Low-cost products will be made from local raw materials. [Food Engin 40(9);1968;13].

F85,39Q;eF81 Citrus products, Flavour Improved flavor and aroma of citrus products

Flavor and aroma of citrus products may be improved through a new process developed by the USDA. According to Dr. Mathew K. Veldhuis of the USDA Agricultural Research Service, the new process provides five to ten times as much flavor essence from citrus peel and processing liquids as obtainable by other method.

Dr. Veldhuis said the new process can help give more of a fresh fruit flavor and aroma to frozen, instant, canned and other manufactured citrus products. Although the essence from the new process is slightly different in character from the essence from fresh juice, it is still an excellent flavoring agent.

In studies with instant orange juice, Dr. Veldhuis said, adding orange essence, as well as "locked in" orange oil, resulted in improved flavour. To recover the essence, peel is finely ground and diluted with enough water to make a slurry. About 20 per cent of the slurry is evaporated and the vapors conducted to an essence recovery unit. The resulting condensate is part citrus oil and part a solution of essence in water.

The processing liquid obtained in the manufacture of cold pressed citrus peel oil is handled in a similar manner, and also yields a distilled orange oil and a solution of essence in water.

"The new process also reduces a waste disposal problem in citrus processing plants" Dr. Valdhuis concluded. [Canner/Packer 137(11); 1968;46].

F85,39ZA Bakery products

Heat-resistant enzyme with time-delay reaction can soften crumb of baked product by action on gelatinized starch. And at high formulation levels it can make inside of baked product pudding-like, or even liquid offering new product opportunities. [Food Engin 40(9);1968;13].

F85,3Zz1-OFE Egg, Freeze-dried

Production of freeze-dried egg has been doubled to 40 tons daily by Rank-Hovis in England. And firm is freeze-drying tea. [Food Engin 40(9);1968;13].

F85,3Z02 Algal Food Algae possible food source

Research is being conducted at the University of South Florid Marine Science Institute to determine the uses of algae as a possible raw material for a new industry.

The algae which are common to the Tampa Bay area yield a gelatinous extract which could be the basis for this new industry. According to Dr. Harold Humm, director of the Institute, a polysaccharide substance in the red algae is already used a stabilizer for chocolate milk, ice cream, syrup, cheese and cake mixes.

Research at the Marine Science Institute will center on cultivation and use of the blue-green, brown and green algae, in addition to the red. Some of the possible uses are low calorie high vitamin and mineral food for humans and fertilizers for animals. [Canner/Packer 137(11); 1968;44].

F85,3Z0375-OF4 Mushroom, Dehydrated Dehydrated mushrooms

MUSHROOM processors have been fighting the battle of the canned and dehydrated imports. A new process yields light-colored pieces with excellent flavor, which on a cost/quality basis may compete well with the imports, according to a paper given at the IFT convention by Michael Komanowsky of the USDA Eastern Utilization Research and Development Division. After Washing, cultivated mushrooms are dipped in a chlorine solution sulfite to inhibit browning, and then air dried for three hours at 100°F and for a final hour at 175°F. [Canner/Packer 137(11);1968;44].

PART IV. Periodicals - Title Service

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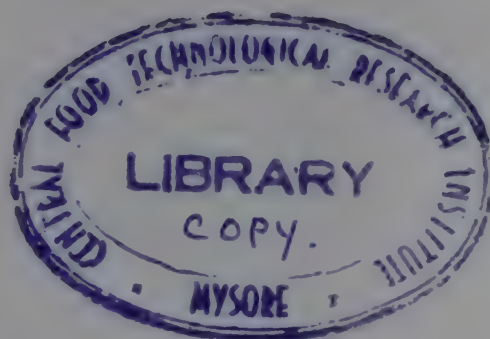
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CONTENTS

1. Additions to Library

2 LIBRARY SCIENCE
A GENERAL SCIENCE
B MATHEMATICS
C PHYSICS
D ENGINEERING
E CHEMISTRY
E9G BIOCHEMISTRY
F TECHNOLOGY
G BIOLOGY
H BOTANY
J AGRICULTURE
K ZOOLOGY
KX ANIMAL HUSBANDRY
L MEDICINE
T EDUCATION
X ECONOMICS

E982

E9G

F

F:7

F1

F94

G

G91

G912

I

I:3

J

J:4:6

J:4:634

J:4:36:634

J371

J374

Enzyme

BIOCHEMISTRY

TECHNOLOGY

Fermentation

Chemical Technology

Fats and Oils

BIOLOGY

Microbiology

Toxicology (Aflatoxin)

BOTANY

Plant physiology

AGRICULTURE

Pest control

Pesticide

Insecticide

Apple

Grape

2. Pamphlets

3. ISI Specifications

PART II. 1. Reprints

2. Reports

PART III. Technical News Brief

F85,3-12-0(9h;91)-0(9PR)

Food, (for) Baby, (made of) Soy protein, Banana

F85,39za-0SB-0F4-0E)(D8)

Nut, Roasted, Dried, Packaged (in) Flexible pouches

F85,39zOn Groundnut

F85,39L1 Tomato

F85,39N-0FC Fruit, Freezing

F85,3C-0F4 Milk, Dried

F85,3Zb1-8X-0FC Beef, Instant, Frozen

F85,3Z1-0910A Beverage, High protein

K86 Entomology

M98 Packaging

X8(F85,3) Food industry

L

L:33

L:461

L:573

L:5730

L293:46

L9C:461

L9C:573

S

S:24

X

X8(F85,3)

X8(F85,3B)

X8(F85,3J)

MEDICINE

Metabolism

Nutritional deficiency

Nutrition

Dietetics

Diabetes

Nutritional deficiency

Child, Nutrition

PSYCHOLOGY

Snell

ECONOMICS

Food Industry

Dairy industry

Butter industry

PART IV. Periodicals-Title Service

2 LIBRARY SCIENCE

2:97 Documentation

A

A GENERAL SCIENCE

A:f Scientific Research

E CHEMISTRY

E5,2831 Organic aldehyde

E6813 Glucose

E6892 Starch

E92Z Amino acid

E92Z2 Protein

E92Z2:3C51 Protein thin layer analy-

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5,3-12-0(9h;91)-0(9PR) Food, (for) Baby, (made of) Soy protein, Banana
AN PROTEIN FOR SPRAY-DRIED BANANAS

A new high protein baby food developed at the Technion research and development foundation, in Haifa, is a powder made from soy protein and bananas. The fruit acts as an attractive carrier for the protein and the protein allows the sticky bananas puree to be dehydrated.

The primary purpose of this research project, which was financed by a grant from the US Agricultural Research Service, was to find an improved process of large-scale extraction to make high grade protein from soybeans. This the Israeli scientists have achieved by designing a system that increases protein yield and shortens extraction time.

The second phase of the work was to convert the extracted protein into palatable foods for use in protein-deficient regions of the world.

Experiments showed that the soy protein could be mixed with bananas without any loss of flavour, colour or nutritive value. And, fortunately, the addition of soy protein made it possible to spray dry pureed banana, which alone is so sticky that drying is difficult and expensive. The banana soy powder can be made into a nutritious drink for babies. Alternatively, the soy powder may also prove acceptable in cheese or bread. A useful increase in the protein content of bread can be obtained by replacing six per cent of the flour with soy protein. (New Scientist 40(625);1968;497).

5,39za-OSB-OF4-OEO(D8) Nut, Roasted, Dried, Packaged (in) Flexible Pouches

Planters is marketing dry roasted nuts in laminated flexible pouches. For proper shelf life pouch is flushed to remove oxygen before heat sealing. Dry roasted nuts previously were glass-packed. [Food Engin (9);1968;13].

5,39zOn Groundnut
GROUNDNUT PROCESSING PLANT FOR BOMBAY

In India, the firm of Tata Oil Mills Ltd has decided to build a factory in Bombay for the production of edible albumens and albuminous foodstuffs from groundnuts. The construction costs are budgeted at Rs. 7m. The Government approved project will take 1-1/2 years to build. Annual production will be 3,000 tons of edible groundnut meal, 1,500 tons of albumen, 1,000 tons of multipurpose foodstuffs, 1,500 tons of babyfoods, 1,000 tons of beverages with a high albumen content, and 2,000 tons of other products with a high albumen content. [Food Tr Rev 38(12);1968;13].

5,39L1 Tomato
SORTING GREEN TOMATOES

Green tomatoes can be sorted objectively according to maturity and potential usefulness with an experimental light transmittance technique, US Department of Agriculture scientists reported recently. A ship-

shipment of green tomatoes may contain immature fruit along with more valuable green mature fruit in various stages of maturity. Green tomatoes look alike, however, and present non destructive commercial sorting techniques, which are based on the degree of external colour, are inadequate for sorting such tomatoes according to maturity.

By measuring the amount of light of particular wavelengths transmitted through green tomatoes it is apparently possible to differentiate immature fruit from green mature fruit and separate the green mature fruit into categories according to how long it will take to ripen them. [Food Tr Rev 38(12);1968;68].

F85,39N-OFC Fruit, Freezing FLUIDIZED BED DRIES FRUIT AND VEG

Quick freezing is the best technique for preserving fruit and vegetables in as near to their fresh condition as possible. But it is by no means easy to ensure that each piece is frozen to just the right degree—pieces should be cooled in such a way that they are completely covered with a thin ice film before being frozen right through to the core. Once frozen, the produce must remain loose and easy to handle even after prolonged storage, while retaining what are essentially the properties of the fresh product.

These demands are met in a fluidized-bed freezer of Czech design. In shape it resembles the top half of an ice cream cone stuck on to a cylinder. The space inside is divided up into a number of compartments by a slowly rotating horizontal ring, which carries the bits of food round with it. Cold air is blown in from below, and produce is fed in from the top, through metering equipment.

A rotary feeder brings it down to the fluidizing chamber in the ring. There, it is claimed, each piece of produce is perfectly fluidized, being brought into intimate contact with a gas or liquid at 36°C . Within a few seconds the pieces become covered with an ice film. The produce stays inside the freezer for one rotation of the ring, which may be anything from three to 18 minutes, depending on the type of produce and treatment and the required degree of freezing. There are normally two phases to the treatment: after the initial freezing to create the ice film the produce is then frozen right through to the core and is then discharged to the packing line. Various combinations of temperature and pressure can be used, the required values being preset on a central control panel.

This type of unit, known as the Rotofluid, is made in several sizes, with chamber diameters of 1 m, 1.5 and 2 m, handling between 500 and 2500 kg. of produce an hour. At first these machines were employed for freezing things which were easily fluidized—peas, currants, blueberries and so on—but later they proved successful with chopped vegetables. They will also handle quite "unfloatable" items, such as apricots, plums, tomatoes and green paprika pods—although in this case the machine acts not as a fluidized bed freezer, but as a cold wind tunnel. [New Scientist 40(619);1968;139].

5,3C-OF4 Milk, Dried NATURAL GAS DRIES MILK

powdered milk is made by spraying a mist of liquid milk into a stream of hot air at a temperature of about 300°F. Although higher temperatures will improve the efficiency of drying, they are difficult to obtain under factory conditions where the air is normally heated by passage over steam coils.

Higher temperatures have been achieved by a simpler process in which a flame burns directly in the air stream. However, most fuel gases produce combustion products which contaminate the food being dried. Although natural gas does not yield such compounds the gases from its combustion contain nitric oxide and nitrogen dioxide which are oxidized and absorbed by milk components, particularly caseinates. Health authorities place upper limits on both nitrate and nitrites in foodstuffs; for technical reasons British buyers demand nitrite-free caseinate.

As part of its research preparatory to the switch over in 1969 to natural gas from the Bass Strait off-shore field, the Gas and Fuel Corporation of Victoria has designed a gas burner producing flue gases low in nitrogen oxides and hence suitable for producing various dried milk products with acceptably low levels of nitrites and nitrates.

Up to 28 parts per million of nitrite were found in caseinate dried directly in a burner type burner fuelled by natural gas. By mixing steam with the flame and excluding primary air steam with the flame and excluding primary air from the burners the nitrite content of the caseinate was reduced to 2.8 ppm. Dried skim milk with less than 0.1 ppm of nitrite was produced with a steam/gas ratio of 2:1. Correlations were found between the combustion products, and the nitrite level of the dried product. Reporting the research, A.B. Rothery points out that drying costs could be reduced by adoption of this method of direct firing in spray driers. New Scientist 40(619);1968;139.

5,3Zb1-8X-OFC Beef, Instant, Frozen INSTANT-FROZEN BEEF

Beef marketing may be radically changed if Swift and Co is successful with its idea of cutting meat into retail portions and then freezing them in liquid nitrogen.

Swift has set up a test plant at Fort Worth, Texas. Steaks and other cuts are prepared from the fresh beef carcasses, dropped into liquid nitrogen and frozen at minus 190 degrees centigrade. They are kept frozen solidly through the rest of the distribution process until the housewife thaws them out at home.

Since the cuts are not exposed to the air for any length of time, the meat is said to keep a good red colour. Cutting out at the plant is expected to be cheaper than cutting the meat in the butcher shop and the meat can be sold in 24 hours instead of 10-15 days reducing the amount of money tied up in inventory. Food Tech Australia 21(2); 1979;80.

F85,3Z1-0910A Beverage, High protein
HIGH PROTEIN BEVERAGE

A new high protein beverage, Mr. Energy, is being test marketed in Northern New Jersey, USA, through the Sisco Dairy Co. The results of the test market are so encouraging that it is expected that the new beverage will be put into nationwide distribution in the USA shortly.

This beverage contains 3.3 per cent protein so that it is equal to whole milk in protein content. The beverage is based on animal protein. It is completely sterilised and is shelf stable so long as the bottle is unopened. This is true even when the bottle is not refrigerated in hot, humid climates and it is expected that the beverage will find a large market overseas in areas where protein malnutrition is endemic.

One 10 oz bottle of the beverage provides 10 g of animal protein. The minimum requirement for animal protein has been established by the United Nations Food and Agriculture Organisation at 15 g. per person per day.

The manufacturer concerned is the Yoo-Hoo Beverage Co., Carlstadt, New Jersey, USA. Food Tr Rev 38(12);1968;66.

K86 Entomology

GRAIN INSECTS DISLIKE THE COLD

Wheat storage authorities in Australia are turning increasingly to aeration as a means of controlling damage by weevils and other insects in bulk wheat. When cool air is drawn through the grain its temperature is lowered to a level at which reproduction of the insect pests either stops completely or proceeds at a negligible rate. Advantages of the method include the absence of toxic insecticide residues and complete safety for operators.

Following research demonstrating the effectiveness and practicality of the aeration method, mechanical engineers in a Melbourne laboratory designed what is believed to be the world's biggest grain aeration system.

The size, number, and placing of the air ducts were worked out from a laboratory model in which the flow of air through grain was simulated by the flow of an electric current through water in a tank of appropriate shape. The system was installed by the Victorian Grain Elevators Board in a vast two-shed storage unit holding half a million tons of wheat.

A completely automatic aeration unit for smaller storages at isolated country locations has also been developed. A prototype unit is giving excellent results near Bendigo, Victoria. An automatic device switches the fans on whenever the outside air temperature is 8°F or more below the grain temperature.

Although such aeration systems work well in temperate climates, they are not effective in the tropics. The Melbourne engineers are currently testing a unit in Queensland that cools grains rapidly with refrigerated air. Although the cost appears reasonable, the effect of the treatment on the insect pest populations has yet to be determined. New Scientist 40(625);1968;481.

Packaging RODENT-RESISTANT PACKAGE POSSIBLE

A new kind of corrugated paper board packaging is expected indirectly to help solve the world scarcity of food. The new material, named Laminite is rodent-resistant and fire-retardant. It was developed by Tri-Wall containers, Inc., Plainview, L.I.N.Y.

Tests indicate that when Laminite is made into containers, it will protect food and grain from rat infestation. Material could be important since, even in U.S., grain destruction by rats amounts to more than five million tons annually. In India, more than 12 million tons of grain are lost to rats each year more grain than India imports in a famine year. Food Engin 40(9):1968;33.

F85,3) Food Industry GROWTH OF SOVIET FOOD INDUSTRY

Novosti Information Service advises us that the Soviet food industry employs some 2,500,000 workers. Despite increasing mechanisation, the dynamic development of this branch of the national economy has resulted in an annual growth of its labour force by nearly 100,000.

At present more than 100 meat packing combines, 250 large dairy and cheese-making factories and scores of canneries and other enterprises are going up in the Soviet Union. They will be commissioned within the next two years and will utilise all the latest advances in technology, it is told.

The expansion of the food industry has been brought about by at least two factors. First the production of meat, milk, fruit, oilseeds and other products, requiring further processing at food enterprises, has grown in recent years at a high rate. For instance, in the past two years 22.2 million tons of meat were produced, against the 18.3 million tons of the preceding two year period.

The same can be said about the production of milk and other produce. In the output of animal fats, milk (nearly 80 million tons in 1967) and dairy products, the Soviet Union is first in the world it is claimed.

The second factor is the growing demand of the population. This year the wages have risen by almost 7 per cent above last year level, while the incomes of collective farmers have risen still higher, and a considerable part of this increase is spent by the population on improving their diet, that is to say, improving the structure of their diet by increasing the proportion of bread bakery products and potatoes consumed and increasing the proportion of meat, butter, milk and fruit.

The five year plan (1966-70) provides for increasing the output of the food industry by 40 per cent. This first half of the five year period has shown that the food industry is somewhat ahead of that plan.

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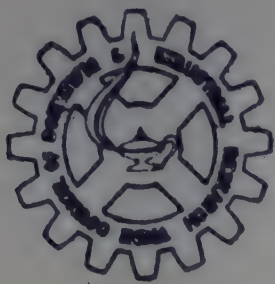
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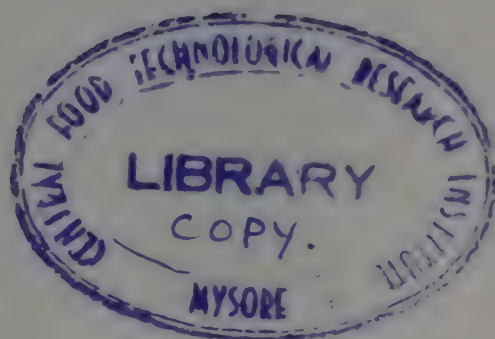
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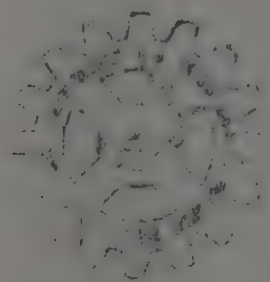
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K ZOOLOGY
M USEFUL ARTS
T EDUCATION
X ECONOMICS

Pamphlets

ART II. 1. Reprints
2. Reports

ART III. Technical News Brief

92Z2 Protein
85,3 Food Technology
85,39ZY-8X-0(9N)-0J4 Sauce, Instant
(made of) Fruit, Flake
85,3M-0(C-T75) Cheese, (made of)
Skimmed milk
85,3Z9b2-0EO(D9a) Beer, Canned

ART IV. Periodicals-Title Service

f GENERAL SCIENCE
Scientific Research

8 MATHEMATICS
Operational Research

813:3 CHEMISTRY
892 Glucose, Analysis
2Z Starch
2Z:3 Amino acid
2Z2 Amino acid, Analysis
2Z2:3 Protein
2Z2:3 Protein, Analysis
2Z2:4 Protein, Synthesis
2Z2J Vegetable Protein
2Z2K Animal Protein
4 Fats and Fatty acids
5 Pigments
6 Lipid
7:3 Vitamin Analysis
74 Vitamin D
B2 Enzyme
B2:3 Enzyme Analysis

BIOCHEMISTRY
B:3 Biochemistry, Analysis

TECHNOLOGY
7 Fermentation
2 Plastics
4 Fats and Oils
4:3 Fats and Oils, Analysis
4:3C58 Fats and Oils, Gas chro-
matographic analysis

G BIOLOGY
G91 Microbiology
G9121 Toxicology (Aflatoxin)

J AGRICULTURE
J:4:634 Pesticide
J:4386:634 Insecticide
J37:5 Fruit development
J37:93 Fruit Physiology
J374:4 Diseases of Grapes
J374:4:6 Grapes disease and Curing
J374:5 Grapes development
J374:93 Grapes Physiology
J3751:93 Mango Physiology
J37943 Tomato
J37971:5 Papaya, Development
J585:93 Caster Physiology

K ZOOLOGY
K86 Insecta
K86:(E9G) Insects, Biochemistry

KX ANIMAL HUSBANDRY
KX332 Fish
KX351:1 Fowl, Nutrition

L MEDICINE
L:33 Metabolism
L:461 Nutritional Deficiency
L:524 Food Hygiene
L:573 Nutrition
L:5730 Dietetics

X ECONOMICS
X8(F85,3):51 Food Marketing
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E92Z2 Protein

PURIFYING PROTEINS QUICKLY

One trouble with proteins is that the interesting ones occur only in small quantities. Before a particular protein can be studied, it must first be separated from a huge excess of other material. Normally this is a tedious business; but now two workers at the National Institute of Health at Bethesda in Maryland have demonstrated a quick method of puri

purifying proteins according to the functions they perform, a technique which promises to become an important new tool in biochemical research.

Their method depends on finding a suitable small molecule that binds to protein, and attaching it chemically to a chromatographic column. If crude material is then passed through the column, the small molecule binds only its target protein, so that all the impurities can be washed away. Finally and sometimes the most difficult step-the pure protein is stripped off the column.

Andro Cuatrecasas and Meir Wilchek have demonstrated the practicability of their method by isolating avidin from egg white. Avidin is a protein that binds strongly to biotin, or vitamin H, and is the cause of the deficiency disease contracted by eating too much egg white. In the latest issue of Biochemical and Biophysical Research Communications (Vol. 33 p. 235) Cuatrecasas and Wilchek describe how they took a derivative of biotin and coupled it chemically to a highly porous polysaccharide gel, taking care to leave plenty of space around the essential parts of the biotin molecular for the avidin to get at it. They passed a solution of egg white through the gel, washed off the impurities and displaced the avidin, perfectly pure and in 90 per cent yield. This achieved 4000 fold purification.

The new technique is tailor-made for an attack on some of the most exciting problems in biology. It should now be possible to isolate in quantity those molecules that act as switches for the control processes of the cell, such as repressors, and to define the sites of action of hormones. Already two groups of workers have obtained the first pure antibodies against known antigens, and brought an understanding of immune recognition one step nearer. [New Scientist 40(627);1968 30].

F85,3 Food Technology

Food Technology College for Glasgow

We hear with interest that the Glasgow Corporation are to build a College of Food Technology, having an area of 150,000 sq. ft. the main teaching block will be on six floor and accommodation will be sufficient for 1,035 students.

The estimated cost of the college is £2m. and building is due to commence in April next year for completion in 1972. [Food Tr Rev 9(2);1968;36].

F85,39ZY-8X-0(9N)-OJ4 Sauce, Instant (made of) Fruit, Flake NEW PROCESS MAKES INSTANT FRUIT SAUCE FLAKES

Instant fruit sauce flakes in a wide variety of popular flavors and colors are a versatile new food ingredient, says food technologist John Kitson of the CDA's Summerland Research Station, Summerland, B.C.

Housewives can reconstitute the flakes into a sauce in a few seconds by mixing with cold water.

dry flakes may be used as a stable, low-cost fruit ingredient for packaged cake and muffin mixes. They may also be compressed into discs, tablets, granules or bars. These can be used to add a note of natural fruit color and flavor to breakfast cereals or candy.

The new product, which has yet to be picked up by commercial processing companies, was developed at the Research Station. The flakes were made by blending fruits such as strawberries, raspberries, black currants or bananas with varying amounts of applesauce, then drying the mixture on a doubledrum drier. The drier, resembling a clothes wringer, compresses the mixture which clings to the rollers. As it rolls around on the drier drum, it is cut by doctor blades and taken off in sheets. The dry sheets are crumbled into flakes when they cool.

The product should excite the fancy of housewives looking for a new taste treat and will also add another line of products for apple growers. Dessert varieties such as red and golden delicious can be used and some mixes may contain 80 per cent applesauce.

Kitson says that although it is hard to estimate the exact monetary value of the discovery for growers, the applesauce blended flakes will certainly return as much to growers as canned sauce and slices.

"It is probable that they could return considerably more if savings in packaging and shipping costs are considered". [Canad Food Indus 39(12);1968;12].

F85,3M-0(C-T75) Cheese, (made of) Skimmed Milk

CHEESE FROM SKIM MILK

A member of the Irish cheese Manufacturers' Association is reported to have succeeded in producing cheese from skim milk, with a moisture content of 70 per cent, for bakery purposes. It promises to find a good market, especially in the USA, at a price of 1s per lb cif American ports, the more so as it would appear that this product is not subject to import quota. [Food Tr Rev 39(2);1969;36].

F85,3Z9b2-OEO(D9a) Beer, Canned

CANNED BEER CATCHES ON

PUBLIC demand for canned beer is making such spectacular strides in South Africa that a new 16 oz. can, developed by Metal Box, is being introduced by the Country's largest brewer.

Introduction of the new can, which is produced at Metal Box's Vanderbijlpark Factory, follows established marketing trends in countries such as the United States and Britain. The bigger can has the advantage of greater volume and economy and like the familiar 12 oz. can, is fitted with the popular easy opening ring pull end. [Food Indus S Afr 21(10);1969;29].

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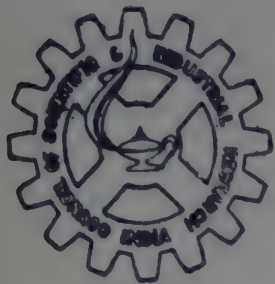
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CENTRAL FOOD TECHNOLOGICAL
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VOL. 8

No. 5

MAY 1969

C O N T E N T S

Additions to Library

GENERAL SCIENCE
 MATHEMATICS
 PHYSICS
 ENGINEERING
 CHEMISTRY
 TECHNOLOGY
 BOTANY
 AGRICULTURE
 ZOOLOGY
 USEFUL ARTS
 ECONOMICS

J581
 J94

Groundnut
 Sugarcane

KX
 KX35
 KX351:1

ANIMAL HUSBANDRY
 Poultry
 Fowl, Nutrition

K86
 K86:3

Insecta
 Insect Physiology

L
 L:33
 L:461
 L:524
 L:573
 L:5730
 L9C
 L9C:461

MEDICINE
 Physiology
 Nutritional Deficiency
 Intoxicant (Poison)
 Nutrition
 Dietetics
 PEDIATRICS
 Nutritional deficiency
 Child

L9C:573

Child, Nutrition

M
 M98

USEFUL ARTS
 Packaging

Pamphlets

RT II. 1. Reprints, 2. Reports

RT III. Technical News Brief

5,3Zm-OE Seafood, Packaged
 5,3Zn-OE Fish, Packages
 5,3Zn;91 Fish, Protein
 4386:634 Pesticides
 C332 Fish

S
 S:22

PSYCOLOGY
 Taste

RT IV. Title Service

f GENERAL SCIENCE
 Scientific Research

-8 MATHEMATICS
 Operational Research

3 CHEMISTRY
 Analysis
 892 Starch
 2Z:3 Amino acid, Analysis
 2Z2 Protein

4 Fats and fatty acids
 6 Lipid

6:3 Lipid, Analysis

82 Enzyme

94 Pectin

G BIOCHEMISTRY

TECHNOLOGY

7 Fermentation
 Chemical Technology
 45 Tin Plate Technology
 4 Fats and Oils

BIOLOGY

Microbiology
 121 Toxicology (Aflatoxin)

AGRICULTURE

4:634 Pesticide
 4386:634 Insecticide
 81 Rice
 81:4386 Rice pests

X
 X:51
 X:89U
 X8(F1)
 X8(F85,3)
 X8(F85,39A)
 X8(F85,3Za)
 X8(F85,3Zn)

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 Purchase
 Chemical Industry
 Food Industry
 Fruit Industry
 Meat Industry
 Fish Industry.

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PART III. Technical News Brief

F85,3Zn-0E Seafood, Packaged

NEW CATERING PACK FOR SEAFOODS: Improved cartons from the Metal Box Co. Ltd. are being used by Young's Seafood Ltd., for their Golden Seafoods range of ready-prepared breadcrumbed shellfish.

These were previously packaged in two-piece waxed cartons overwrapped with a label stating the contents. The new multipurpose packs achieve product identification by means of self adhesive coloured stickers.

MetalBox's Speke factory was responsible for the functional design of the cartons. These are made from coated folding box-board, are coated externally with polythene, and incorporate a tear-strip opening on the flap. The cartons are assembled on a Kliklok JR machine and closed on a Btite C14 machine.

The surface decoration, originated by Spottiswoode Advertising Ltd., is printed by Lithography in two colours and a gloss. It features, in red against a yellow background, the name Youngs in antique style lettering and a bold stencil impression of a prawn, which is the company's symbol. Food Process Market 38(450);1969;112].

F85,3Zn-0E Fish, Packages

MINIATE PROVIDES IMPERVIOUS BARRIER FOR WET FISH: A vacuum sealed pouch enables Finbarr Sea Foods to market smoked and fresh fish in Supermarkets. The laminate which prevents moisture and vapour transmission is Rayothene 320 laminate. Printed and laminated by Pakcel Converters Ltd., it consists of British Sidac's 300 MSDT Rayothene cellulose film which is extrusion coated with 200 g low density polythene. The strong heat seals given by this laminate have proved well able to stand up to supermarket handling. At present eight varieties of fish are available. Food Process Market 38(450);1969;110.

MSF, 42N, 51. Fish. Protein

SCHEME TO PRODUCE FISH PROTEIN CONCENTRATE: The Kerala Fisheries Department has drawn up a scheme for making 'Fish protein concentrate' in the Marine Technological Institute at Calicut with the aid of UNICEF and CARE. For the present it is planned to produce 100 kgs. of concentrate per day as a pilot scheme. The equipment required for this will be provided by UNICEF. The product, in the form of powder, can be mixed with wheat flour or maida. There is also a proposal to prepare fish sausage of Calicut. The only handicap, according to reports, is the non-availability of tissue paper to protect the sausage from getting spoiled. Seafood Export J 1(3);1969;29.

J:4386:634 Pesticides

NUCLEAR TECHNIQUES TO TRACE PESTICIDES: Ways of using nuclear techniques to investigate contamination of food by pesticide residues are under consideration by the International Atomic Energy Agency and the Food and Agriculture Organization of the United Nations.

Experts from 10 countries and from the World Health Organization have recommended research action, assistance to developing countries to investigate the problems and collaboration.

In setting up residue levels that are unlikely to give rise to health hazards, precise information is needed on what happens to the pesticide from the time it is applied to food during growth to the time it is consumed by man. Very often, the food eaten is not in the same state as the food harvested or shipped. The amount of pesticide residue can be affected by storage, processing and cooking. In addition, the original chemical can become transformed or give rise to daughter products, or metabolites, which may be more toxic than the parent pesticide.

Precise studies into the fate of pesticides in the food chain would involve the determination of very small amounts of pesticides and their metabolites. For this purpose, one of the most promising techniques would be to use radioisotope labelled pesticides. Food Process Market 38(450);1969;88.

KX332 Fish

WORLD FISH CATCH SETS NEW RECORD: World fish catch set a new record in 1967, according to the Food and Agriculture Organization of the United Nations (FAO). Marine and fresh water catch was 60.5 million metric tons, almost twice the 31.5 million caught a decade before, and more than three times the 1948 catch.

In terms of quantity landed, Peru stood first followed by Japan, Soviet Union, Norway, South Africa, Spain and India. India ranked eighth in the world for fish production in 1967. Seafood Export J 1(3) 1969;31.

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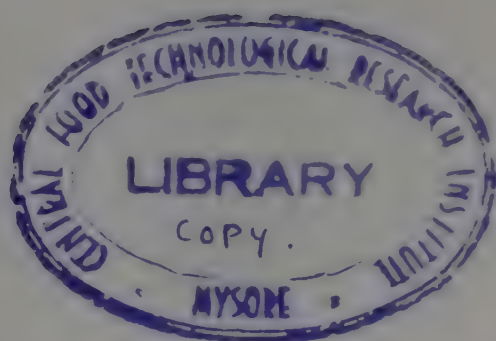
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1 Vitamin A

3 Vitamin C

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F
F:7
F145
F94
F94:3
TECHNOLOGY
Fermentation
Tin technology
Fats and Oils
Fats and Oils, Analysis

G
G91
G9121
BIOLOGY
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I
I:3
I:(E2G)
I22
BOTANY
Plant Physiology
Plant Biochemistry
Algae

J
J:4:634
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AGRICULTURE
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KX
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ZOOLOGY
Insecta
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L
L:33
L:461
L:524
L:573
L:5730
L9C:573
MEDICINE
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M
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X
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F85,3-0FC Food, Freezing

LIQUID NITROGEN FOR FREEZING FOOD: Less than three months after launching, Britain's first commercial foodfreezing service using liquid nitrogen, Chr. Salvesen and Company, one of Britain's largest operators of sub-zero cold stores, is to increase the nitrogen freezing capacity of the Grimsby plant. It has ordered from Air products a large Cryo-Quick freezer capable of handling 3000 lb. of produce an hour to replace the existing 600 lb./h. model on which initial trials were carried out.

Freezing foods with liquid nitrogen is quicker than the established methods of cooling in an air blast (since the air is not so cold as the nitrogen) or on a refrigerated plate. The time involved is of the order of 10 minutes, compared with several hours. Besides, at, the liquid nitrogen at 320°F freezes the food so rapidly and uniformly that it stops it becoming dehydrated and prevents the formation of large ice crystals which damage its cells. The food is loaded on a stainless steel conveyor and passed through an insulated tunnel where it is precooled by nitrogen vapour and then frozen by a spray of liquid nitrogen. A fully automated production line can be controlled by one man.

Salvesen handles about a quarter of all the frozen food supplies distributed in Britain, and has processed a variety of foods on the Cryo-Quick, including whole plaice and salmon, plaice and cod fillets, poultry, fresh fruit, pastries, bread rolls and various meat products. The Air Products parent company has sold roughly 50 freezer units in the US, and in Britain, where selling began only about a year ago, three or four are in use, and inquiries for more are in hand. (New Scientist 41(641);1969;616).

F85,3-1 Food (for) Children

PROTEIN FOOD FOR CHILDREN: A diet supplement which has restored the health of children whose diets lack protein has been developed by nutrition experts from Britain, the United States, Lebanon and Jordan. The team manufactured the substance from boiled wheat and chick pea with vitamins, minerals and skim milk.

Called laubina, the supplement was developed especially for feeding infants and young children in India, Pakistan, the middle east, North Africa and North and South America. The substance is a fine powder which can be put in liquid, mixed into a paste, or sprinkled on foods.

The research, which is being conducted at the American University in Beirut, is headed by Dr. James W. Cowan, associate professor of nutrition at the university. According to Cowan, "laubina is better than any native cereals because it has a higher amount of protein and better protein balance". A child's total protein requirement and one half his calories could be furnished for three and one half cents a day. Canner/Racker 138(2);1969;29.

F85,39h-00L Soya, Flour

SOYA FLOUR IMPROVED: Soya flour treated with acid is as good as milk substitute with animal protein added. H.A. Ramsey, head of the dairies section, State University, Raleigh, N. Carolina, U.S.A., has claimed soya bean flour treated with acid is twice as good as a calf food as untreated flour.

The soya flour is cooked as for normal feed use, then reacted with a combination of hydrochloric and phosphoric acids for five hours. Sodium hydroxide is then added to restore the normal pH balance. The procedure may be reversed, by incubating with sodium hydroxide first, then cutting alkalinity with the acids, with equally effective results.

The treatment is now being tried on the cheaper and more fibrous soya meal. [Milling 151(3);1969;14].

F85,3Zn-OE Fish, Packaged

FISH VACUUM-PACKED IN SHRINK BAGS: Following extensive work by W.R. Grace Ltd., in France, many French fish products are now vacuum-packed and frozen in cryovac shrink bags. The process is said to offer important economic and practical advantages over the cardboard packs previously used.

Process and materials are similar to those which have been used in the turkey industry for many years. The prepared fish is inserted into a Cryovac bag of suitable size, which is then evacuated, sealed with a metal clip and shrunk to a skintight finish by immersion in hot water. During the vacuum process any excess water present in the pack is automatically ejected.

The result is an attractive pack in which the Cryovac bag acts virtually as a second skin. It can be colour printed with recipe instructions and brand identity. The sales appeal is further enhanced by the fact that the housewife can examine the product she is buying through the transparent film. [Fish News Intern 8(3);1969;60].

F85,3Z9b1-OEO(D9c) Wine, Packaged (in) Bottles

OLD WINE IN NEW BOTTLES: Carbonated drinks, including beer, can now be marketed in destructible bottles of plastic and paper developed by Rigello Pak of Sweden. Weighing just 20 gm. the new bottle is of "space capsule" design and is claimed to offer sufficient gas barrier properties to guarantee a shelf life of two months.

It consists of a cylinder-shaped container with hemispherical bottom, a cone-shaped top, a tear-off cap, and a sleeve made of laminated paper. The sleeve not only reinforces the cylinder but its lower end also serves as a stand for the bottle: it also projects the contents from decomposition. A special compound of rigid PVC with high tensile strength and low gas permeability, and with barrier properties improved by a coating of polyvinylidene chloride, is the basic material of the bottle.

For bottling and capping, standard bottling machines can be used with minor adjustments. Labelling is not required as the paper sleeve can be printed and decorated as desired by the suppliers. These bottles will be a boon to countries where carbonated drinks are in extensive use and the disposal of glass bottles garbage presents a problem. [Invention Intelligence 3(11);1968;4].

J:4:634 Pesticide

A NEW CARBAMATE PESTICIDE, FURADAN, HAS BEEN DEVELOPED BY FMC'S Niagara Chemical Division. It has just been granted registration by U.S. Department of Agriculture to combat corn rootworm. It will be available in limited amounts in the corn belt this spring. By 1970 the company also hopes to have registration for use of Furadan on alfalfa, sugar cane, rice, peanuts and Irish potatoes. In the field tests the new pesticide has proved effective against strains of corn rootworm that have developed resistance to other pesticides. According to FMC, Furadan will enable a farmer to plant his corn earlier and obtain higher crop yields. Chemically, the product is 2,3-dihydro-2,2-dimethyl-7-benzofuranyl methyl carbamate. [Chem. & Engin News 47(13);1969;47].

J:4386:634 Insecticide

DEVELOPING VIRAL INSECTICIDES IS THE LATEST USE for the high speed liquid zonal centrifuge at Oak Ridge National Laboratory. The first goal is to isolate enough virus material to make a field-scale trial on control of the tussock moth, a pest which kills douglas fir trees. Dr. Julian Breillatt of ORNL directed development of a centrifuge separation system to isolate the virus in one step from

from crude homogenate of the caterpillar of the many bacteria it contains, which would make it dangerous if sprayed in watershed areas. Zonal centrifugation reduces the bacteria count from one bacterium per inclusion body, a particle containing the virus in the cells of infected tussock moth caterpillars, to one bacterium per 4 million inclusion bodies. This level may permit use in watershed areas. [Chem & Engin News 47(11);1969;39].

J37 Fruits

RESEARCH ON TROPICAL FRUIT IN EUROPE: There is a lack of experience in possible methods of processing the increasing range of familiar tropical fruits sold in the common market countries so that they can compete in flavour with other articles. This includes lack of knowledge of sources and conditions of supply and failure in contact between potential suppliers and interested processors. Neither supplies nor quality are sufficiently reliable to permit long range planning.

This is some of the reasoning behind the decision of the Applied Economics Department for Industrial and Developing Countries at the Battelle Institut EV at Frankfurt, to constitute a study project.

It is expected the ultimate report will give data on the feasibility of opening up new markets, data on increasing the market share in present markets, securing sources of raw materials in good time and information on product developments such as flavour, preservation and packaging. It may also provide partial substitute for the manufacturers own sales analyses. The study will cover the Benelux countries, West Germany, Denmark, France, Italy, Sweden and the U.K. [Food ProcesMarket 38(450);1969;88].

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CENTRAL FOOD TECHNOLOGICAL
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VOL. 8

No. 7

July 1969

C O N T E N T S

PART I. Additions to Library

<u>Books</u>	E9G	BIOCHEMISTRY
GENERALIA	F	TECHNOLOGY
Encyclopaedia	F:7	Fermentation
GENERAL SCIENCE	F1	Chemical Technology
CHEMISTRY	F94	Fats and Oils
E9G BIOCHEMISTRY	G	BIOLOGY
TECHNOLOGY	G91	Microbiology
85,3 Food Technology	G9121	Toxicology (Aflatoxin)
BIOLOGY	I	BOTANY
AGRICULTURE	I:(E92Z)	Plant Amino acid
ANIMAL HUSBANDRY	I:(E95)	Plant Pigment
MEDICINE	I:(E982)	Plant Enzyme
MC PADIATRICS	I:(E9G)	Plant Biochemistry
ECONOMICS	J	AGRICULTURE
<u>Pamphlets</u>	J:4:634	Pesticides
<u>ISI Specifications</u>	J:4386:634	Insecticides
<u>PART II. 1. Reprints, 2. Reports</u>	J371:93	Apple Physiology
<u>PART III. Technical News Brief</u>	J37943	Tomato
E982 Enzyme	J381	Rice
F:7 Brewing	J674	Chillies
F85,3:xP,F4 Food, Preservation	K	ZOOLOGY
Drying	K64	Rotifera
F85,39QB;eF31 Orange, Flavour	K86	Insecta
F85,39ZC Bread	KX	Animal Husbandry
F85,3M-OF4 Cheese, Dried	KX332	Fish
F85,3Za;a06:fD Meat, Quality,	KX35	Poultry
Analysis	KX351:1	Fowl Nutrition
F85,3Za;eF31 Meat, Flavour	L	MEDICINE
F85,3Z1-(9PR-9h;91)-OQL Beve-	L:461	Nutritional deficiency
rage, (made of) Banana,	L:524	Food Hygiene
Soy-protein, Powder,	L:573	Nutrition
F85,3Z7-OF4;eF316 Fruit,	L:5730	Dietetics
juice, Dried, Aroma.	M	USEFUL ARTS
<u>PART IV. Periodicals, Title Service</u>	M98	Packaging
GENERAL SCIENCE	X	ECONOMICS
Scientific Research	X8(F85,3)	Food Industry
CHEMISTRY	X8(F85,3-OQL)	Flour Milling Indus-
813 Hexose	X8(F85,39A)	Fruits & Vegetable
892 Starch		Industries
2Z Amino acid	X8(F85,39Zf)	Confectionery
2Z2 Protein		Industries.
2Z2:4 Protein synthesis	
212J Vegetable protein		
71 Vitamin A		
72 Vitamin B		
74 Vitamin D		
82 Enzyme		
94 Pectin		

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chunky, p. 83.
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PART III. Technical News Brief

1. E982 Enzyme

PROTEOLYTIC ENZYME AIDS PRODUCT AND PROCESS: Both the processing and quality of many foods may be improved by a powdered microbial proteolytic enzyme, which is completely water-soluble and active over a wide pH range.

Called "HT proteolytic 200," the new enzyme improves both the baking process and taste of soda crackers, vanilla and sugar wafers, oatmeal cookies, and similar products. Mixing time is cut, as is the amount of shortening required to give desired tenderness. In addition to improved flavor, bakers report excellent open grain in crackers, increase of spread, exceptionally even bake, improved uniform browning and rolling of dough.

Manufacturers of breakfast foods find the enzyme helpful in modifying the gluten and starch elements, which frequently alter the physical form and the drying characteristics of grains. The product is also used for tenderizing meats, to chill-proof beer, and as an additive to animal feeds.

The enzyme's high potency, which permits reduction of transportation and handling costs, is maintained indefinitely during storage under dry conditions at normal temperatures. Its bacterial origin allows controlled activity and unlimited supply. Inactivation is accomplished by heat, strong acid or alkali, and certain chelating agents.

The product is packed in 100 lb. fiber drums. A concentrated form is also available in 50 lb. drums. Marschall Div., Miles Laboratories Inc., Elkhart, Ind. Food Engin 41(3);1969;49.

2. F:7 Brewing

IMPROVES BREWING: It was discovered recently that better results were obtained in brewing when raw barley was not cooked before adding it to the mash. Up to 50% of coarsely ground barley plus 50% malt has been mashed successfully to yield beers of normal analysis, stability and taste qualities. There is an increase in mashing time with an increase of raw barley in the mash. The extended mashing period is a disadvantage of the process. Onderwijs and Het National Instituut voor Brouwerij, Markt 1, Zewewele, Belgium. Food Engin 41(3);1969;133.

3. F85,3:xP,F4 Food, Preservation, Drying

NEW FOOD DRYING METHOD: Perishable foods such as fish, meats, shrimp, fruits and vegetables can be dehydrated and preserved by a rapid heat transfer method at low pressures and temperatures. Treated products retain delicate flavors and textures.

Procedure: Immerse foods, under vacuum, in bath of hot edible oil which consists of acetylated monoglycerides of oleic, linoleic palmitic or stearic acids either alone or in mixtures. Heat is transmitted

through the oil into food products. Moisture is released from food and removed by high vacuum, which helps preserve delicate flavors and aromas. Degrees of vacuum and temperature vary with type of food dehydrated. After completion of drying, oil is removed by centrifuging. - U.S. Patent 3,408,210. Food Engin 41(3);1969;133.

4. F85,39QB;eF31 Orange, Flavour

DEVELOPS NATURAL BITTER ORANGE FLAVOR: Flavor produces taste of Curacao liquor, derived from peels and blossoms of a special bitter orange. Bitter-orange is adaptable to bakery, beverage, confection and dessert products.

Named "Natural Curacao Flavor," it is also available in spray-dried version that is one-quarter strength of liquid form. Powder is for use in cake mixes, beverage powders, and gelatin and pudding powder. Rhodia Inc., New York City. Food Engin 41(3);1969;49.

5. F85,39ZC Bread

BAKING BREAD FROM BEANS, NUTS AND CASSAVA: Everyone likes bread, it seems. Even in those countries where rice, yams, or cassava are the staple diet, it is fast becoming popular. Unfortunately, these countries cannot afford to import more wheat flour. So to find a way round the problem, the Food and Agriculture Organization of the United Nations asked the Institute of Cereals, Flour and Bread, at Wageningen, to investigate the feasibility of making bread from flour obtained from these indigenous crops. The difficulty is, these crops contain practically no protein, so that flour has to be mixed with flour obtained from peanuts or soya beans.

The problem has been how to make bread of acceptable taste and texture. After extensive trials, and relying on their considerable knowledge of the physics and chemistry of bread-making, the Institute concluded the ideal mixture was one containing starch isolated from Cassava flour, plus cassava flour itself and soya flour. This, when wetted, gives a mixture resembling a batter more than a wheat-flour dough, but the bread baked from it has a crisp crust and a reasonably fine crumb texture. It looks midway between a cake and a loaf.

The protein content of the new bread, derived from cassava and soya flour, is superior that of wheat-flour bread. When peanut flour (of lesser protein content) is substituted for soya flour, it is still about equal in protein to wheat-flour bread. The protein is also more digestible. Rats fed on bread made from cassava-soya mixes increased in weight more rapidly, for every gram of protein they consumed, than those fed on bread made from wheat flour. Cake and fancy buns can also be made from the new mix; it is in fact in every way comparable with wheat flour. The Institute now suggest (Food Technology), Vol.22 p. 867) that the next step is to set up pilot bakeries in various countries to establish the new product and refine it to suit local tastes. New Scientist 42(646);1969;18

6. F85,3M-OF4 Cheese, Dried

DRIED CHEESE REHYDRATES TO WELL DEFINED PARTICLES: Blue and Italian cheeses can now be dried to individual particles which, on rehydration, assume the texture of crumbled fresh cheese.

Known as "Granblue" (Blue) and "Gran Fontene" (Italian) products offer superior uniformity. They are of uniform particle size and color and flavor **are** evenly distributed throughout. Moreover, they reportedly have the stability and flavor retention of spray-dried cheeses.

Both products can be used in any dry-mix dip or seasoning blend. They are also recommended for liquid salad dressings because of ease of handling, stability and low bacterial count. - Universal Foods Corp., Milwaukee. Food Engin 41(3);1969;50.

7. F85,3Za;a06:fD Meat, Quality, Analysis

DETERMINING MEAT QUALITY: Meat spoilage can be detected chemically and organoleptically. Extent of spoilage can be determined by the following chemical tests: total volatile nitrogen, free fatty acids, peroxide, pH changes, extract release value, tyrosine, and several others. Further, it is necessary to correlate results of chemical tests with organoleptic evaluation of meat.

For routine quality control, macrodistillation of volatile nitrogen seems to be the most reliable tests.-Jour. of the Science of Food and Agriculture 19(7);1968;357-363. Food Engin 41(3);1969;134.

8. F85,3Za;eF31 Meat, Flavour

FLAVOR NUGGETS IMPROVE PRE-FORMED MEAT PATTIES:, Texture, flavor and appearance of preformed hamburger patties are enhanced by nuggets that impart butter or cheese flavors. Irregularly shaped in sizes upto 1/2 in., the nuggets do not require refrigeration, are easily dispersible, and have color and flavor typical of the products they represent. Moreover, they can be used in other foods as well.

Butter-flavored nuggets consist of actual butter fortified with artificial butter flavor and stabilized by a hydrogenated animal fat system. Highly resistant to rancidity, they melt at temperatures reached in cooking ground and formed meat products, and release genuine butter aroma.

Cheddar-cheese-flavored nuggets resemble cheddar crumble. They are made of genuine cheese, with flavor artificially intensified. A hydrogenated animal-fat system plus a trace of gum stabilizer enable the nuggets to retain their original shape when melted. And they do not stick or burn onto the grille.

Pizza-cheese-flavored nuggets resemble irregularly shaped pieces of mozzarella or pizza cheese. Their formulation and performance characteristics are similar to that of the cheddar nuggets.-Centry Corp., Seasonings Div., Fairlawn, N.J. Food Engin 41(3);1969;49.

9. F85,3Z1-(9PR-9h;91)-OQL Beverage, (made of) Banana, Soy-protein, Powder

PROTEIN BEVERAGE. POWDER ENRICHED: Bananas and soy protein have been combined by Israeli scientists to form a new protein-enriched powder for beverages. The addition of soy protein, a non-sticky substance, reduces markedly the stickiness of banana puree. And the combination is suitable for spray drying.

Further, bananas are an appetizing carrier for soy protein without sacrificing color, flavor, or nutritive properties. The banana-soy powder might be used also for weaning and infant feeding where there is a milk shortage. Technion, Haifa, Israel, 1968. Food Engin 41(3);1969;134.

10. F85,3Z7-OF4;eF316 Fruit juice, Dried, Aroma

IMPROVES AROMA OF VACUUM-DRIED JUICES: Low temperature vacuum drying minimizes damage to color, flavor and nutritional qualities of dried foods. Reduced temperatures are especially suitable for drying fruits and fruit juices, since their aroma consists largely of volatile compounds such as acetic acid, ethyl acetate, and ethyl butyrate.

The volatility of some fruit aromas were tested quantitatively by adding known amounts of aroma to pectin solutions or to grape juices and vacuum drying the solutions.

Most of the aroma losses occurred during the early stages of drying. An increase of aroma in dried fruit and fruit juices occurs when concentrated fruit juices are used and when high drying temperatures are avoided. Food Technology, 22(5);1968;623-627. Food Engin 41(3);1969;133.

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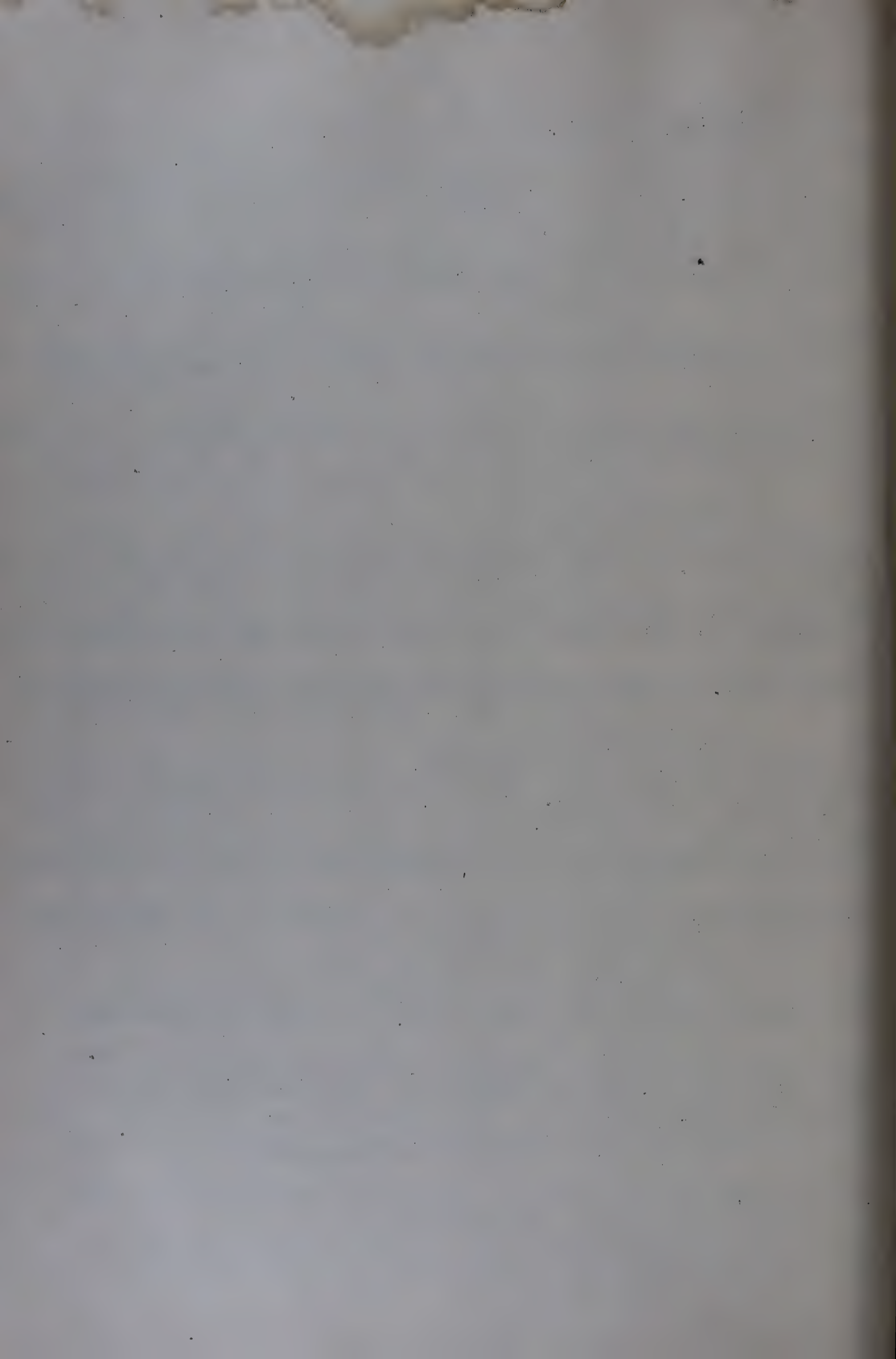
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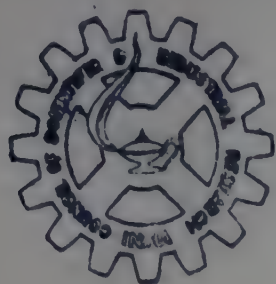
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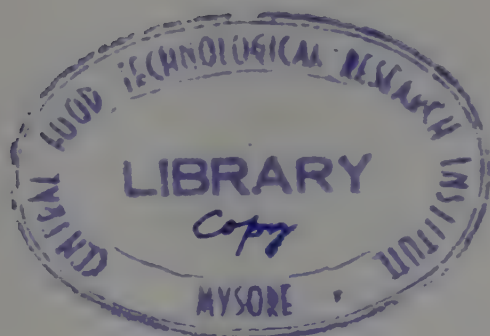
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G BIOLOGY
I BOTANY
J AGRICULTURE
K ZOOLOGY
L MEDICINE
P LINGUISTIC
T EDUCATION
X ECONOMICS

2. Pamphlets

PART II. 1. Reprints.
2. Reports.

PART III. Technical News Brief.

E6813 Fructose
F85,3 Food
F85,3;0(G91) Food, Microorganism
F85,3Zz1:F2SAL Egg products,
Salmonella
F85,3;F4A Food, Aflatoxin
F85,3;9745 Food, Vitamin E
F85,3Zn:xP,FM Fish, Preservation
Salting
F85,3Z9b2-OEO(D33) Beer, Packaged
(in) Bottle
I21 Yeast
I23 Fungi
I22 Algae
J:4:634 Insecticide

PART IV. Periodicals-Title Service

2 LIBRARY SCIENCE
2:97 Documentation
A GENERAL SCIENCE
A:f Scientific Research
E CHEMISTRY
E191 Metal
E92Z Amino acid
E92Z2 Protein
E92Z2:4 Protein synthesis
E94:3 Fat, Analysis
E97 Vitamin
E971 Vitamin A
E972 Vitamin B
E982 Enzyme
E994 Pectin
E9G BIOCHEMISTRY

F

F:7

F94

G

G91

G9121

I

I:(E982)

I:(E9G)

J

J:4:634

J24386:634

J341:(E95)

J341:(E9G)

J372

J3752:93

J58

J581

J581:93

J588

J588:(E982)

KX

KX35

KX351:1

L

L:461

L:524

L:573

L:5730

L9C:573

M

M98

X

X8(F85,3)

X8(F85,3B)

X8(F85,3Zn):545

X8(F85,39A):545

X8(F85,39ZA)

X8(F85,39ZA) Baking Industry.

TECHNOLOGY

Fermentation

Fats and Oils

BIOLOGY

Microbiology

Toxicology (Aflatoxin)

BOTANY

Plant enzyme

Plant Biochemistry

AGRICULTURE

Pesticides

Insecticides

Potato pigment

Potato Biochemistry

Orange

Pineapple physiology

Oil seed

Groundnut

Groundnut physiology

Soybean

Soybean enzyme

ANIMAL HUSBANDRY

Poultry

Fowl, Nutrition

MEDICINE

Malnutrition

Poison

Nutrition

Dietetics

Child, Nutrition

USEFUL ARTS

Packaging

ECONOMICS

Food Industry

Milk Industry

Seafood Export

Fruit and

Vegetable Export

Baking Industry.

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### PART III. TECHNICAL NEWS BRIEF

#### E6813 Fructose

**ZYME CONVERSION OF DEXTROSE TO FRUCTOSE:** Glucose isomerizing is capable of converting dextrose, or corn sugar, into levulose (fructose). Fructose is a natural substance not generally found in great quantities. It is fermentable and has a relative sweetness value of 130 on a scale where sugar is 100 and dextrose is 75.

Commercial production of this enzyme should lead to the development of highly fermentable corn syrups with unprecedented sweetness according to Clinton Corn Processing Co., Clinton, Iowa. Properties of the syrup will also show a radical difference from those of corn syrup. Food Tech Australia 21(5);1969;230.

#### F85,3 Food

**FOOD PIONEER:** Of particular interest to the food industry is the bicentenary of the birth of Friedrich Accum on March 29, 1769. Accum was a German immigrant who set up in London at the end of the 18th century as consultant, while running a noted school of practical chemistry and centre for supplying chemicals and apparatus. While the gas industry will be commemorating him, and the medical world will remember him for his combating of adulteration of drugs, his work in the cause of pure foods was equally invaluable. Accum had studied brewing, wine making and baking in his researches on "culinary chemistry". But then came his careful chemical analysis to expose the adulteration of vinegar, cheeses and other products. In 1820 he published his major work, the "Treatise on the Adulteration of Food and on Culinary poisons".

Accum had his critics, especially of his sub-title: "Death in the Pot", a caption from Pocula Morte Carent used first in Lucan's Pharsalia. Yet as professor at the Surrey Institution near Blackfriars Bridge and well-known lecturer to London audiences. Accum had the necessary chemical knowledge to substantiate his work in times when the presence of iron impurities in foods was roughly shown with a gall extract, or when the test for copper compounds was simply to use a steel knife-blade. Food Manuf 44(3);1969;34.

#### F85,3;0(G91) Food, Microorganism

**MICROORGANISMS AND FUTURE FOOD SUPPLIES:** According to FAO, for the first time since the last war food production per head did not rise during 1965-66, and in many developing countries there was a decline of up to 5 per cent. That this problem is uppermost in the minds of many food technologists, microbiologists and nutritionists was clearly demonstrated by the large attendance at a symposium on "Microorganisms and future food supplies" held recently at Grimsby College of Technology. The discussion was lively and controversial.

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H.J. Bunker, President of the Institute of Biology and Pioneer microbiologist, present the first paper, "Sources of single cell protein". In it he briefly reviewed the historical background of microbial protein use and surveyed important aspects that must be considered for the future development of novel protein sources. He said that the initial advantage of using microbial cells for obtaining protein is their rapid growth rate. The generation time of micro-algae, for example, can be 1-1/2 to 3 days. A further important advantage is that growth of microbial protein often entails the use of what would otherwise be waste material at present a quarter of a million tons of fodder and food yeast is being made each year from waste materials in different parts of the world.

However, Bunker warned that the overriding factor affecting the choice of organism or substrate must be non-toxicity. He concluded by pointing out that as far as supplementing world protein sources is concerned, time is running out and therefore all conceivable methods should be tried. Food Manuf 44(3);1969;33.

#### F85,3;21;F2SAL Egg products, Salmonella

SALMONELLA IN EGG PRODUCTS: Lactose-fermenting salmonellae, although unusual, have been isolated from clinical cases and from food, reports P.L. Poelma (J. Ass. Off. Analyt. Chem., 51,870,1968). The existing tests allow samples which show the ability to ferment lactose to be discarded. In the light of this information the author recommends that all cultures should be tested in the usual way. Food Tech Austral 21(6);1969;295.

#### F85,3;F4A Food, Aflatoxin

BIO-ASSAY OF AFLATOXINS: A new bioassay method for the carcinogenic and acutely toxic metabolites of the fungus *Aspergillus flavus*, often associated with foods and feeds. Uses as the test organisms developing eggs and larvae of the zebra fish (*Brachydanio rerio*), which can be obtained easily in the laboratory throughout the year. The organisms are very sensitive to sub-microgram quantities of the toxins, especially of aflatoxin B-1 the most potent component. The larval response is easier to measure than embryonic response and a standard dosage-mortality curve for the larvae can be developed in 33 hours.

The maintenance of the fish, preparation of test samples and procedures are outlined and the toxic effects are illustrated by Z.H. Abedi and W.P. McKinley (JAOAC 51, 902, 1958). The larvae are far more sensitive than ducklings, conventionally used, and offer also some degree of bio-assay specificity for each toxic or chemically related compound. Food Tech Austral 21(4);1969;172.

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## F85,3;9745 Food, Vitamin E

**VITAMIN E CONTENT OF FOODS:** A massive compilation of data from the literature on the vitamin E content of foods (M.W. Dicks, Bulletin 435, Agr. Exp. St. Univ. Of Wyoming, Dec. 1965) was promoted by the growing recognition of the importance of this vitamin in human nutrition and the possibility that, under some conditions, the supply may be critical. The author, who is in the Division of Biochemistry, Agricultural Experiment Station, University of Wyoming, points to the trend toward consumption of more unsaturated fats, in some cases as a result of medical advice. This would call for more vitamin E because of its antioxidant action. At the same time, studies made in both Great Britain and the United States have shown that a small percentage of the population has dangerously low blood levels of vitamin E. This 194-page review tabulates the data on food and feed content of vitamin E according to these categories: milk fat; land animal fats; marine animal oils; vegetable fats and oils; processed fats-margarines and shortenings; grains and grain products; baked cereal products; fruits; nuts and seeds; vegetables; livestock feeds; colostrum, milk and milk products; eggs, meat and meat products; fish and fish products; microorganisms and yeasts; bee foods, chocolate products, molasses, and puddings. There is a table which shows the per cent of each of the tocopherols in the total tocopherol in all foods and feeds. **is-** A brief discussion of the chemistry of the tocopherols is included. Food Tech Austral 21(4);1969;172.

## F85,3Zn:xP,FM Fish, Preservation, Salting

**A QUICK SALTING PROCESS FOR FISH:** Fish is a valuable source of protein and supplies are available but it must be preserved satisfactorily at as low a cost as possible. Salting and drying should be a simple process for fish preservation but in warm climates spoilage takes place before sufficient salt has penetrated to preserve the centre. Work carried out to develop a rapid salting process is described by F.R. Del Valle and J.R. Nickerson (Food Tech 22, 104, 1968). The salt can be removed before consumption by leaching in boiling water. The work as carried out with shark and other fish are under examination to determine the efficiency of dehydration when ground fish and salt are mixed. Food Tech Austral 21(5);1969;227.

## F85,3Z9b2-OEO(D83) Beer, Packaged (in) Bottle

**OXYGEN IN BOTTLED BEERS:** A modification of the indigo-disulphonate method, worked out by Kipphan, is described by H. Hiefner and D. Burwig, Brauwissenschaft, 21, 11, 1968. Small ampoules containing the indicator, dextrose, glycerol and dilute KOH, are put into clear glass sample bottles which are filled together with the other beer bottles. After breaking of the ampoule, the solution reacts with the dissolved oxygen. Standard colour bottles are used for calibration. The method may also be applied to food colouring mixtures. Food Tech Austral 21(4);1969;172.

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## I21 Yeast

VALUE OF YEASTS: Professor A.H. Rose of the University of Bath in a stimulating paper dealt with the value of yeasts as a protein source. He stressed that the importance of yeasts, which are nutritionally acceptable for human consumption, is that their large-scale production is at a technically advanced stage.

He discussed the effects of nitrogen, carbon and dissolved oxygen limitation as well as temperature on the accumulation of fat, protein and DNA in the cells; he emphasised that alterations in metabolic balance can play as important a part as genotype manipulation when producing high-protein strains of microorganisms. Food Manuf 44(3);1969;33.

## I23 Fungi

HIGHER FUNGI: A paper on the "Mycelium of higher fungi as a source of protein" by J.T. Worgan put forward similar arguments advocating the use of mushrooms and other macrofungi as supplements for protein deficient diets. Higher fungi, he said, are acceptable as food supplements not only because of their edibility and pleasant bland flavours but also because of their large-scale growth which has been made possible by the use of homogenised mycelium inoculum technique. Other advantages are: their high protein content (the speaker said that their nutritional value merits further research); their efficient utilisation of nitrogen; and the fact that many species can utilise cellulose and hemicellulose as sources of carbon - some wood rotting organisms are even able to utilise lignin.

The advantage of this last point is that large-scale growth can be carried out on industrial or agricultural waste materials or in submerged culture of molasses and waste sulphite liquor. By the adoption of the latter technique a 60 per cent protein content in the mycelium has been reportedly achieved.

The two main problems in this work are that culture identification is difficult future work must place emphasis on this problem and the cellulose component of higher fungi is particularly difficult to hydrolyse. This is due to the mainly crystalline nature of cellulose structure. However, cellulose contains amorphous regions readily attackable by enzymes or reagents, and further work may solve this problem.

Worgan stated that future work must also include research on culture maintenance and the amino acid composition of the higher fungi. Food Manufacture 44(3);1969;33.

## I22 Algae

ALGAE FOR FOOD: In a controversial paper by W.A. Vincent of the Balle Institute it was stated that a comparison of available protein from various sources showed that micro-algae have the

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biggest potential in this respect. His paper, "Techniques, uses and costs of algae for food and feed", gave the following figures; cattle breeding will produce about 54 lb. of dry protein per acre per year; fish, 560 lb; clover-leaf protein, 1,500 lb; *Spirula plantensis*, 21,200 lb; and *Chlamydomonas mundana*, 43,000 lb of dry protein per acre per year.

This indicates the increased efficiency in area utilisation that algae farming would have over conventional farming a yield difference of up to 800 times for algal protein in comparison with meat protein. This dramatic difference is mainly due to sunlight wastage by conventional farming since it is basically a batch rather than a continuous system; a contributory factor is that the geometry of plants does not allow them to make full use of sunlight.

A cost breakdown indicates that a high initial investment would be needed, since cooling, circulation and other engineering equipment would account for about 68 per cent of the cost. It was estimated that land and harvesting costs would amount to only about 7 and 16 per cent respectively of the total. Costs, however, must be balanced against the higher protein return and less exacting growth and climatic requirements. Food Manufacture 44(3);1969;23.

#### J:4:634 Insecticide

PLANT GROWTH AFFECTED BY INSECTICIDES: Organic insecticides have caused much concern, ever since the publication of *Silent Spring*, for their persistence and toxicity to animal life. The case of penguins at the South Pole containing appreciable amounts of these chemicals is often quoted. Now it seems that certain of these insecticides-the organophosphorous aphicides-can affect plant growth and development.

r. Nigel Scopes that Imperial College, London, grew seeds of wheat broad bean and sugar beet in soils mixed with varying amounts of a range of organophosphorous insecticides. Reporting his findings in *Plant Pathology*, (Vol.18, p.10) he shows how these insecticides, particularly Thionazin, when mixed in with sand on field soil, can delay the germination of wheat seeds for two weeks, produce abnormalities among those that do grow, and lower the growth appreciably whether this is measured by the height of the plant or by its dry weight.

m beans, effects can be seen at a concentration of 27 ppm of chemical for example, necrotic leaf lesions where the insecticide is accumulating. Growth of the seed leaves of beet is inversely related to the concentration of insecticide applied. Germination is also delayed, and with 125 ppm of Phorate or Thionazin, germination is reduced to 63 to 70 per cent of controls without these chemicals.

Similar results were found in a field experiment for sugar beet, but beans grown and tested in the field plots with insecticides showed no significant reduction in the final yield. Weeds, however, were always less frequent in treated field plots, and in those treated with 250 ppm of Thionazin, no weeds grew for a year after application.

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The organophosphorous insecticides then show important signs of damage on Dr. Scopes' test plants, and although they are not persistent in soil like the organochlorine chemicals as DDT, this factor of phytotoxicity will have to be calculated with the economy of their use. New Scientist 42(645);1969;133.

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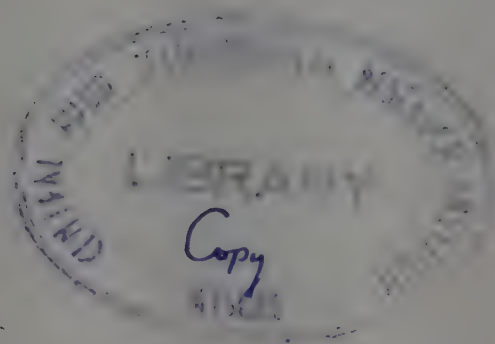
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PART III. TECHNICAL NEWS BRIEF

## 92Z2 Protein

UTCH PROTEIN INTEREST: The development of the protein concentrate derived from gas oil was explained to a party of British feed compounders by Dr. van der Wal, Institute for Agricultural Research of Biochemical Products, during their tour of Dutch Experimental Farms, feed mills and agricultural research centres, organised by Trouw & Co., (Great Britain) Ltd.

The production of this new pig and poultry feed constituent, claimed to be nutritionally equivalent to the best fish meal, is forecast for next year in Scotland and France. The protein has been developed by British Petroleum, but tested in Holland on pigs, broilers and layers.

The party also attended lectures on lysine as a corrective of the amino acid balance in protein feeds, and a talk by Prof. Hirschfield of Utrecht University. In addition they visited the independent grain feed mill at Weesperkarspel, where 20 workers produce over 200,000 tons of feed per year in an automate plant. [Milling 151(7);1969;17].

## B5,3:xP,FC Food, Preservation, Freezing

CALCULATION OF FREEZING TIMES: The processing time required in the freezing of a food body may be divided into a precooling, freezing and tempering period. Several formulae are available for estimating these periods and others are derived in a paper by N.D. Cowell (Inst. of Refrig. Bull., 47, 968, 1967). By arranging the variables in dimensionless groups, the formulae may be simplified. Examination of the relationships between these groups and comparison of alternative formulae can then be conveniently made using graphical methods, [Food Tech Australia 21(7);1969;343].

## 5,39E1-OT15 Potato peel

NEW POTATO PEELING PROCESS: A potato peeling process being developed by the US Department of Agriculture promises to help potato processors comply with strict new Federal Pollution regulations.

The experimental process, dry caustic peeling, is being developed by USDA's agricultural Research Service. It can keep out of the effluent or waste as much as 75 per cent of a processing plant's potato peeling and almost all the caustic used in processing. This would greatly simplify treatment of effluent before it is discharged into streams and would help processors to meet new standards for waste disposal that will be difficult to meet with present facilities.

In the experimental process, potatoes are sprayed for 50 to 100 seconds with a 20 per cent lye solution at 170°F. After a brief drain, the potatoes are held at room temperature for 5 minutes, then tumbled in a perforated drum for 2 to 5 minutes under gas fired infrared burners which radiate 1600°F heat.

During this tumbling, from one half to two thirds of the peel is removed. The rest is removed by rotating rolls with flexible fingers and by brush-washing. In this way the peels can be kept separate from water-borne wastes, possibly can be treated ~~xx~~ for use in cattle feeds, or otherwise disposed of.

The work is being conducted at the ARS Western utilization research laboratory, Albany, Calif. [Food Tech Australia 21(7);1967;343].

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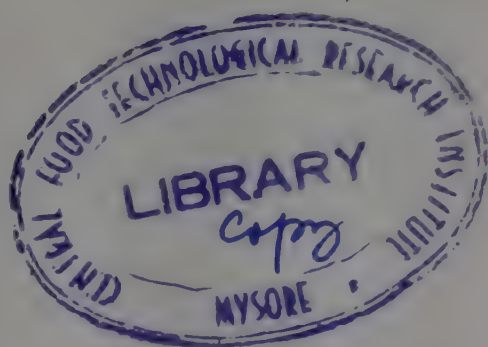
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Vol. 8

No. 10

OCTOBER 1969



# C O N T E N T S

## Additions to Library

### 1. Books

D  
E  
F  
J  
L  
M  
T  
X

ENGINEERING  
CHEMISTRY  
TECHNOLOGY  
AGRICULTURE  
MEDICINE  
USEFUL ARTS  
EDUCATION  
ECONOMICS

### 2. Pamphlets

#### PART II. 1. Reprints

#### 2. Reports

#### PART III. Periodicals-Title Service

A  
A:f  
B  
B48

GENERAL SCIENCE  
Scientific Research  
MATHEMATICS  
Operational Research

E  
E:3E5  
E:3E53  
E6813  
E92Z  
E92Z2  
E92Z2:3  
E92Z2:4  
E92Z2J  
E92Z2K  
E94  
E95  
E96  
E972  
E974  
E982

CHEMISTRY  
Absorption analysis  
X-Ray analysis  
Hexose  
Amino acid  
Protein  
Protein analysis  
Protein synthesis  
Vegetable protein  
Animal protein  
Fat  
Pigments  
Lipids  
Vitamin B  
Vitamin D  
Enzyme

E9G BIOCHEMISTRY

F  
F:7  
F94

TECHNOLOGY  
Fermentation  
Fats and Oils

G  
G91  
G912  
G9121

BIOLOGY  
Microbiology  
Bacteriology  
Toxicology (Aflatoxin)

I  
I:3

BOTANY  
Plant Physiology

J  
J:4:834  
J:4386:634  
J3  
J333  
J341:93  
J3513  
J37:93  
J371  
J371:93  
J372  
J374  
J374:93  
J37943  
J37943:93  
J387:(E982)  
J582  
J646

K  
K86:33

ZOOLOGY  
Insect metabolism

KX  
KX311:1

ANIMAL HUSBANDRY  
Cow feeding

L  
L:461  
L:524  
L:573  
L:5730  
L9C:573  
L9C:5730

MEDICINE  
Malnutrition  
Food poison  
Nutrition  
Dietetics  
Child, Nutrition  
Child dietetics

M  
M98

USEFUL ARTS  
Packaging

S  
S:22

PSYCHOLOGY  
Taste

X  
X8(F85,3)  
X8(F85,39zn)  
X8(F85,3M)

ECONOMICS  
Food Industry  
Copra Industry  
Cheese Industry

xxxxxxxx

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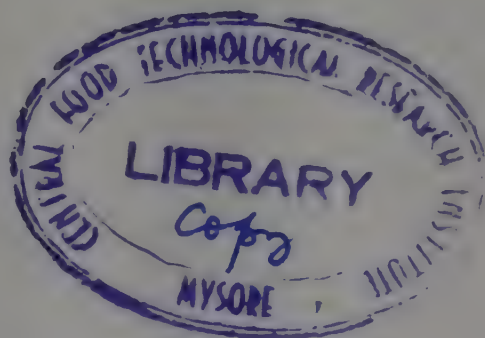
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CENTRAL FOOD TECHNOLOGICAL  
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Vol. 8

No. 11

NOVEMBER 1969



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F TECHNOLOGY  
G BIOLOGY  
I BOTANY  
U AGRICULTURE  
T EDUCATION  
S PSYCHOLOGY  
X ECONOMICS

E971  
E973  
E982  
E996  
E9G

Vitamin A  
Vitamin C  
Enzyme  
Sterol  
BIOCHEMISTRY

### 2. Pamphlets

#### PART II. 1. Reprints, 2. Reports.

#### PART III. Technical News Brief.

1. F85,3;91 Food Protein  
2. F85,30Z Grain  
3. F85,311 Rice  
4. F85,39E1-OT15 Potato, Peeled  
5. F85,39H21 Lettuce  
6. F85,39N-OEO(D9a) Fruit, Canned  
7. F85,39Zg-OE(D9a) Candy, Packed  
8. F85,3C-OEO(D9h) Milk, Packed  
(in) bags  
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10. L9C:573 Child, Nutrition  
11. M98 Packaging

F  
F:7  
F1  
F94  
  
G  
G91  
G9121

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Chemical Technology  
Fats and Oils

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Microbiology  
Toxicology (Afla-  
toxin)

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J:4386:634  
J382

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Wheat

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KX351:1

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Insecta  
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L  
L:33  
L:461  
L:4A  
L:573  
L:5730  
L9C:461  
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Malnutrition  
Aflatoxicosis  
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Child Nutrition

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M  
M98

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X8(F85,3)  
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E6814 Dextrose  
E688 Polysaccharide  
E6892 Starch  
E711 Benzene  
E92Z Amino acid  
E92Z:3 Amino acid, Analysis  
E92Z2 Protein  
E92Z2:4 Protein Synthesis  
E92Z2J Vegetable protein  
E92Z2J5 Oil Protein  
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NEW LOW COST, HIGH PROTEIN FOOD CALLED "TAMUNUTS" has been made from glandless cottonseed kernels at Texas A & M. Glands can be removed and kernels free of them have been developed genetically. When deepfried, kernels have nut-like flavor and texture. Food Engin 41(7);1960;13.

#### 2. F85,30Z Grain

HANDLING GRAIN AT TILBURY - The structural faults in the silos recently built at Tilbury dock - The UK's largest grain-handling port - should not seriously affect grain shipments. Engineers have been steadily eliminating the inevitable teething problems of the installation since it started ~~commercial operation for the~~ Port of London Authority, in June.

The Tilbury installation is one of the world's most advanced grain handling facilities. It can discharge bulk carriers of up to 65000 tons deadweight (limited by the 42 ft. spring low tides) with a high degree of automation, at a rate of 2000 ton/h grain is used in adjacent flour mills and some is trans-shipped by smaller vessels using a deep-water outlet. The terminal is also linked to the new orbital road system and the railways. The loading jetty is 100 feet long, and is linked to the silo installation by an 800 ft. approach jetty. This carried fast conveyors to the silos.

Loading and unloading of the vessels is carried out by two 130 ft high elevator towers. A single tower can unload grain at the rate of 1000 ton/h., using either a bucket chain conveyor - which dips into the ship's hold - or pneumatic elevators. The pneumatic elevators, which can each unload up to 200 tons an hour, are normally used to clear a ship's hold of grain that cannot be reached by the conveyor. Each elevator tower contains an automatic scale which can weigh grain at the rate of 1000 ton/h. Grain is removed from the towers by two

1000 ton/h conveyors. It is fed to the silos or to barge-loading points. One of the conveyor belts to the silos is reversible, to enable grain to be conveyed from the silos to the barges.

The present capacity of the silos is 105000 tons, with a capability for expansion to 240000 tons. The silos are 127 feet high 200 feet including the headhouse-with bin capacities from 60 to 900 tons. All the silos are interconnected, with an indicator showing grain movements within them. New Scientist 43(662);1969;332.

### 3. F85,311 Rice

DETERMINING MILLING YIELD OF RICE - Up to date equipment for automatically weighing, computing and printing out information on the milling yield of rice samples is to be developed by scientists at Texas A & M University college station under a three year co-operative agreement with the US Department of Agriculture.

Older laboratory mills with which graders determine sample yields are less efficient than the latest commercial milling equipment. To help make rice grading and pricing more accurate the US Department of Agriculture's Agricultural Research Service is contributing \$ 67,726 towards the development of laboratory equipment that will give milling yields closer to those being obtained in modern commercial rice mills.

The scientists will study milling equipment for long, medium and short grain rice in commercial plants and in rice grading laboratories. Based on their studies, they will determine the feasibility of designing new laboratory equipment and will develop principles for such machinery. Food Tr Rev 39(8);1969;56.

### .. F85,39E1-OT15 Potato, Peeled

DRY PEELING POTATOES - A method, whereby drying potatoes and peeling them mechanically enables the skins to be kept out of sewage lines and to be converted into cattle feed, has been worked out by the Western Utilization Laboratory, U.S. Department of Agriculture, Albany, California, US, so as to reduce the load on sewage systems.

Potatoes peeled by water sprays give an effluent with a high biological oxygen demand.

The laboratory's method calls for the potatoes to be soaked in a lye solution, then instead of passing under high pressure water sprays, the potatoes are dried by infra red burners. From these they go forward to rollers covered with rubber projections, which rub off the softened skin.

Peeling residues consist of about 25 per cent solid matter; fermented to reduce the alkalinity, they can be used to feed cattle, says the laboratory. Food Tr Rev 39(9);1969;78.

### F85,39H21 Lettuce

SHIPPING VACUUM-COOLED LETTUCE ACROSS COUNTRY WITH LIQUID NITROGEN refrigeration reduced oxygen and carbon dioxide concentrations to curtail deterioration. There was less decay, butt discoloration, russet spotting and tipburn. Moisture loss was halved in USDA tests. Food Engin 41(7);1969;13.

6. F85,39N-OEO(D9a) Fruit, Canned

FRUITS IN CANS WITH TRANSPARENT LID ARE MARKETING IN JAPAN by Toyo Co., Tokyo. Lid is molded polycarbonate that is positioned manually and affixed by metal rim applied with semi-automatic seamer. Plastic withstands 275F without damage. Cost per can is 12% higher. Food Engin 41(7);1969;13.

7. F85,39Zg-OE(D9a) Candy, Packaged

FANCY ASSORTED CANDIES ARE POSITIONED IN PACKAGE, piece by piece, by series of vacuum transfer arms that lift pieces from plates fed by vibrating feeders. System was devised by Kaman Automation. Food Engin 41(7);1969;13.

8. F85,3C-OEO(D9h) Milk, Packaged (in) Bags

MILK IN BAGS GAINING - In Canada, more than 30 dairies are reporting success in marketing milk packaged in 3 qt. plastic pouches. Consumer acceptance has been so good, with so few complaints, that smaller pouches are now being readied for vending and institutional use. In the future, individual servings of milk, grape juice, etc., may be packaged aseptically for use at home or away. Food Engin 41(7);1969;25.

9. G911 Bacteria

BACTERIA CAN BE GOOD FOR YOU - With the current world shortage of protein, attention is being turned to sources of high quality protein other than the conventional animal or plant sources. Yeast has been grown on cheap carbohydrates for years, and now a few types of bacteria hold promise as sources of cheap, nutritious digestible protein. One of these bacteria is Hydrogenomonas eutropha, which has the merit of being readily cultured in a simple liquid medium containing only inorganic salts, gaseous hydrogen, oxygen and carbon dioxide. H. eutropha is currently under investigation for application in fields as diverse as animal feed supplements and as a regenerative life support system for manned space flights. In this latter case it is reported that the bacterium would produce edible protein from urinary and faecal waste products of the astronauts.

Dr. D. Galloway of the Department of Nutritional Science, University of California, and Dr. A. Kumar of the Department of Biochemistry, School of Medicine, University of Pittsburgh, who have examined the cell protein of H. eutropha, find that its composition and nutritional value compare favourably with more conventional protein foodstuffs (Applied Microbiology, Vol. 17, p. 176). Cells of the bacterium were harvested from the culture medium and the cell protein analysed to determine amino acid composition: a useful guide to the food value of any protein is its content of those amino acids essential for healthy growth of animals. The protein was found, for instance, to have a high content of the essential amino acid lysine, suggesting that H. eutropha could form an excellent supplement to cereal grain diet which are low in lysine.

Boiled or sonically disintegrated bacterial cells were incorporated into diets fed to rats, while control groups of rats were fed diets containing egg protein or the milk protein, casein. The biological value of the diets was estimated from the amounts of unabsorbed protein present in the excreta of the rats. The net uptake of the bacterial protein was 72 per cent, only slightly less than the 76 per cent uptake of casein. Casein was 99 per cent digestible and the bacterial cells were 93 per cent digestible.

ne results show that H.eutropha can be an excellent source of high quality protein and could be both a substitute for, and a supplement to, animal proteins. But whether anyone will ever actually eat them is another matter altogether. New Scientist 43(656);1969;22.

D. L9C:573 Child, Nutrition

NON-DAIRY IMITATIONS OF MILK THAT ARE LOW IN PROTEIN, Minerals, vitamins compared to milk are generally undesirable in the diets of children and infants, in the opinion of the council on Foods and Nutrition of American Medical Association. Food Engin 41(7);1969;13.

L. M98 Packaging

PACKING THE POWDERS - Bulky packages of fine powders contain a lot of air. But the powders cannot rapidly be compressed to a volume convenient for transit using high pressures, since dispersibility of the powder might be affected. A process that is said to achieve the required result uses conveyor belts to gently squeeze the packages, first in one direction then another. The wrapper must be porous, it is stated, preferably paper, and care must be taken not to squeeze the package too rapidly during the first few strokes otherwise air trapped in the space above the powder will be forced between the particles rather than out through the wrapping. Conveyor belts are essential, it is claimed, since they allow any size of package to be treated and also allow the process to be automated. British Patent 1 152 078. Pittsburgh Plate Glass Industries Incorporated, Pittsburgh. New Scientist 43 (656);1969;23.

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BOTANY  
AGRICULTURE  
MEDICINE  
USEFUL ARTS  
GEOGRAPHY  
ECONOMICS

### Pamphlets

## ART II. 1. Reprints, 2. Reports

## ART III. Technical News Brief

F85,39a Legume  
F85,32a Meat

## ART IV. Periodicals-Title Service

LIBRARY SCIENCE  
:97 Documentation  
GENERAL SCIENCE  
:f Scientific Research  
CHEMISTRY  
:5 Organic Chemistry  
:68 Carbohydrates  
:682 Disaccharide  
:6892 Starch  
:92Z Amino acid  
:92Z:3 Amino acid analysis  
:92Z2 Protein  
:92Z2J Vegetable protein  
:94 Fat  
:943 Edible oil chemistry  
:982 Enzyme  
:9G BIOCHEMISTRY  
TECHNOLOGY  
:F:7 Fermentation  
:F1 Chemical Technology  
:F94 Fat and Oil  
:F943 Edible Oil  
BIOLOGY  
:G91 Microbiology  
:G9121 Toxicology(Aflatoxins)

I  
I22 Botany  
I225 Algae  
Phaeophyceae  
J  
J:4:634 AGRICULTURE  
J:4386:634 Pesticides  
J3411:93 Insecticides  
J3411:93 Sweet potato physiology  
J37:93 Fruit physiology  
J386:93 Barley physiology  
J481 Coffee  
KX  
KX332 ANIMAL HUSBANDRY  
KX35 Fish  
KX351:1 Poultry  
Fowl Nutrition  
L  
L:33 MEDICINE  
L:461 Metabolism  
L:573 Malnutrition  
L:5730 Nutrition  
L9C:573 Dietetics  
Child, Nutrition  
M  
M98 USEFUL ARTS  
Packaging  
S  
S:22 PSYCHOLOGY  
Taste  
X  
X:51 ECONOMICS  
X8(F85,3Zn) Marketing  
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### F85,39a Legume

LEGUMES AS FOOD - A joint symposium on legumes as food breeding to consumption will be held by the Institute of Food Science and Technology and the London branch of the Institute of Biology at the School of Pharmacy, 29/39 Brunswick Square, London WC1 on 6 January 1970. Details may be obtained from either of the organizations concerned. Food Proces Indus 38(458);1969;15.

### F85,3Za Meat

the last word....ON MEATLESS MEAT - Those ultimate ingrates who question whether scientific research is, on balance, of benefit to mankind have lately been forced to bite their spiteful tongues by the news that from laboratories of an American food firm there has come to the market the first meatless turkey roast complete with plastic wishbone. It has not been indicated whether this Man-made merrythought is notched for easy breakage, but, if not, there are likely to be more dislocated little fingers about than dreams come true next Thanks giving day.

The meatless turkey is made, like almost everything else, from soybean substitute. Food Scientists have found means to flavour and texture the high-protein soya-mush so that it looks and tastes like meat. Heralded as "the food of the future" it is already lurking incognito in United States supermarkets as extra bulk to make "meatier" the flesh ration in frozen ravioli for TV dinners. Sales of this ersatz masquerade are estimated at about £4 million this year, tripling the figure of five years ago, and all concerned look forward confidently to a prosperous future on beefless beef, hamless ham, cheeseless cheese and one frabjous day! Callooh! Callay! - soybeanless soya-mush.

The verisimilitude of the present mock turkey roast could gainfully be extended beyond the palate and into the visual dimension. With the assistance of an experienced taxidermist, it should not be too difficult for its ingenious inventors to come up with a series of; plastic bird shapes, heat-resistant, edible in emergency and carbeable by the extravagant if so desired. A deflated bird-skin would be given free with each family size tin of the appropriately flavoured meatless meat. Turkey, duck, goose, chicken and guinea-fowl could be reproduced by the housewife, in oven-brown, mouth-watering colours, just by stuffing the avian bags to life-size capacity with soya-goo. Quail, grouse, ortolan, pheasant, capercailzie and ptarmigan bodies could later be provided to bring the luxuries of haut cuisine to hard-up epicures for merely the labour of five minutes stuffing-up and 20 minutes in a medium oven (Regulo 4).

American gorges, accustomed as they are to public food which though as highly coloured as a strumpets, outing, tastes uniformly of savoury cotton-wool, may perhaps not rebel against this prospect of enforced vegetarianism. The considered opinion of our home-grown moguls of cordon bleu on the plastic wishbone development is not available at the time of going to press. But it is rumoured that, when asked for their reaction to a future of larders filled exclusively with 57 varieties of jazzed-up soya-goo, Fanny Craddock reached for her heaviest mintchopper, Robert Carrier called for his duelling pistols, and clement freud turned his sad eyes to heaven and murmured, "Mrs Beeton thou shouldst be living at this hour!". New Scientist 44(672);1969;173.

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